Before the Jesuits were expelled from Abyssinia, the glory of Portugal had come to an end. But this Abyssinian episode is not the least interesting portion of that brilliant history of Portuguese heroism which has been sung by Camoens. "At the proudest moment of that brief and glorious period," says Schlegel, "a great national song broke forth like the dying notes of the fabled swan, a dirge for the departed hero-nation."

From the expulsion of the Portuguese in 1633 to the arrival of Bruce in 1770, Abyssinia was, with the single exception of the physician Poncet's visit in 1699, closed and unknown to Europeans. The labours of more recent explorers, since Bruce's time, have been admirably sketched up to 1842, by our President, Sir Roderick I. Murchison, in his Anniversary Address of 1844. Numerous travellers have crossed the country since then; missionaries, sportsmen, and consuls, and now there is every probability that this most interesting region will, at least for a time, be more completely opened up than has ever been the case since the time of the Portuguese.

II.—*Geographical Results of the Abyssinian Expedition.* By C. R. MARKHAM, Esq., Secretary, Royal Geographical Society.

(*Read*, February 24, 1868, and June 8, 1868.)

I.—COAST PLAIN ROUND MULKUTTO.

Senafè, December 31st, 1867.

THE proceedings of the reconnoitring party under Colonel (now Brigadier-General) Merewether, Colonel Phayre (Quartermaster-General), and Colonel Wilkins, R.E., have extended over the months of October, November, and December, and the arrival of the Commander-in-Chief may be considered to have brought their preliminary labours to an end. This then is an opportune time for taking stock of the geographical results of the first three months of the Abyssinian expedition.

The reconnoitring party have explored the sea-coast from Mulkutto to Hawâkil Bay, examined and surveyed two passes up the mountains to the Abyssinian table-land—indeed, they may be said to have discovered that leading to Senafè—and reconnoitred about 50 miles of the table-land itself. My own work has hitherto been confined to the plain round Mulkutto, the pass up to the Abyssinian plateau, and the neighbourhood of Senafè.

The point of disembarkation in Annesley Bay is a few yards south of the place where the dry bed of the Hadas reaches the sea; and it is the nearest point on the coast to the foot of the

Map showing the
LINE OF MARCH
FROM THE COAST
TO
ADIGERAT
15° 30'
15°
40°
39° 30'
Raya
Bokur I.
HAWÂKIL BAY
Arena
B U R I
Mt Dulhi
Mt Abdur
Mt Mangabo
Durket Hill
Kusrale
Plain of Wangaboo
Makannale
ANNESLEY BAY
OR GHUBBET DACNOO
Dissee I. or Valentia Island
MULKUTTO
Camp Malkutto
Arafali
Usadia Torrent
Well
Atafat Hot Spring
Burial Ground
Zulla
Ruins of Adulis
Aftah
Adambago
Mt Gadam
Shayk Ismaels Tomb
Urole Zambo
Komayli
Hadas R.
HASAROTAS
Lower Range of the Abyssinian Chain
Ooah
Adoda
MASSOWA
Arkeeko
Addi Habib
Hidale
Galala
Asowl R.
Lower Sooro
Upper Sooro
Middle Sooro
Deema
Illaleea
Shum-faito

15°
Raya
Bokur I.
HAWÂKIL BAY
Arena
Harartkee Boree
Sandy Plain with grass the whole way
Angora
Kuneechera Peaks
Oongalee
Moodgullee
Ramole
Plain of Summoter
Ullut Torrent
Water Spring
Top of Pass
Steep descent
Bad stony Ground
Mabaly
R
I
U
Mt Abdur
Mt Mangabo
Booyah
Stony Plain
Well
Durket Hill
Plain of Galata
Plain of Wangaboo
General Merewether's Reconnaissance
Lowest Range of the Abyssinian Chain
Kusrale
EY BAY
ET DACNOO
Arafali
Undul Torrent
MULKUTTO
Camp Mulkutto
Burial Ground
Well
Hot Spring
Zulla
Mt Aydale
RASSAMOS
Mount Sowayra 10,328 ft
Komayli
Wells
Lower Sooro
Upper Sooro
Enzola
Senafe
Arabi Teleel
Mt Koma
Guduley
Mata Libanos
Mount Ishe
Kuskusa
Plain
Degonta
Irar
Mallarte
Adoda
Lower Range of the Abyssinian Chain
HASAHOTAS
Hadas R.
Illalea
Deema
Illabiya
Shum-Saito
Gonzobo Pk.
ZULLA
Halai
Sundaffe Plateau
Hadas
Alternate deep Ravines & sharp ridges

14° 30'
40°
39° 30'
Sandy Plain with grass the whole way
Hararkee Boree
Kunechera Peaks
Angora
Limestone Range
Hill Mara
Lower Ragolay
Oongalee
Moodgullee Hill
Mt. Mullaboo
Ragolay Torrent
Upper Ragolay
Caballa R.
Plain of Summoter
Ramole
Stony Plain
Bad stony ground
Top of Pass
Dendrara Torrent
Ullat Torrent
Water Spring
Steep descent
Mt. Bayto
Mt. Dubshado
Mt. Rahulee
Mt. Hurraso
Gursur Torrent
Endayly Torrent
Lasguddy Torrent
Mabaly
of the Abyssinian Chain
H A S O S
S O R U
Endayly R.
Lasguddy R.
Kesawa Pk.
Arrakoma Pk.
Goonde-goonde
Asimba Pk.
Mai Baraso
Asofa Plateau
Alitiana
Sabaya Pk.
Hahim Plateau
Europe Tribe
Sabea
Gooatcoloo Hills
Saraay Plateau
Oulet R.
Adigerat 8585 ft.
Uarat Range
Mt. Alequor
Dookole
Mount Sowayra 10,328 ft.
Senafe
Arabi Teleck
Mt. Koma
Gudaley
Mata Libanos
Mount Isliro
Kuskusa Plain
Degonta
Amun Pk.
Mudhullo Torrent
Alternate deep Ravines & sharp ridges
Sandstone Plateau
Sandstone Plateau
Feeasha
Antoflo
Adabagi
Zohollo
Salode
Addoatotti
Mukeenda
Moolukosyu
Abaabook
Eggreana
Esanue Hills
Gula-mukada District
Debra Matso
Dalle Mycha
Addeguna
Dair
Dungello
Attagenat
Sutto
Kema
Addi-gooden
Gaiger
Oboamantee
Behat
Plateau
District of Wudukallee
Gonzobo Pk.
Age Shiuti
U Z Z A
L A S A Y
A S O S
G A
M E

The torrents flowing down the passes to the Sea Const are dry, except during the freshes in the rainy season.

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mountains—the distance being about 10 miles. The site of the encampment is called Mulkutto, from a well of that name, about a mile from the shore. I found the latitude by meridian altitudes of *Capella* and *Sirius* to be 15° 15′ 51″, N.; the longitude by a chronometer observation of the Navigating Lieutenant of H.M.S. *Satellite*, 39° 46′ 15″, E.

The sea is very shallow for some distance from the shore, and the spring tides rise so as to cover a considerable area of the low land which, near the beach, has a slope of about 1 in 400. The ordinary rise and fall of the tide is 4 feet 6 inches.

The plain looks green from the anchorage, and when it is clear there is a magnificent view of the Abyssinian Alps, the passes clearing them laterally from north to south, so that the ridges appear to rise one above the other in a succession of waves. But on landing all illusion to which the green appearance of the land may have given rise is at once dissipated. A sandy plain, overlying clay, extends from the sea shore to the mountains, which is intersected by dry beds of torrents, and overgrown with such plants as salicornia, acacia, and calotropis. There are also tufts of coarse grass in patches.

The shores of Annesley Bay, or more properly Ghubbet Dacnoo, were, as is well known, the point whence the Greeks, in the days of the Ptolemies, carried on a thriving trade with Axum, by way of Degonta; while the Portuguese and modern travellers have recently taken the route by Massowa. The ancient Greek city of Adulis, the emporium of this trade, was close to the shore; but the ruins are now at a distance of 4 miles on the left bank of the Hadas. On a few mounds concealed by salicornia bushes, there are broken pieces of fluted columns, capitals, and other fragments of a very dark-coloured volcanic stone. But a great wealth of antiquarian treasure may be concealed under the mounds, and Dr. Lumsdaine, after making a very slight excavation, found the bronze balance and chain of a pair of scales; an appropriate first discovery in the ruins of a great commercial city. The modern village of Zulla is at a little distance on the right bank of the Hadas.

The Shohos, who inhabit this plain, are a black race, with rather woolly hair, and small boned; but with regular, and in most instances even handsome features. They wear a cotton cloth round the middle, and a cloak of the same material, the head and feet bare, and are always armed with a curved sword, worn on the right side, spear, club, and leathern shield. They cultivate a little *jowarree*, and have cattle of a very diminutive breed, asses, goats, and sheep. Their huts are scattered over the plain; while their burial places are extensive, and appear to be used by the people for a considerable distance around

them—there being only two between the coast and the entrance to the Senafè Pass—one of them close to the ruins of Adulis. The mode of sepulture is peculiar. The graves are marked by oblong heaps of stones, with upright slabs at each end. A hole is dug about 6 feet deep, at the bottom of which a small cave is excavated for the reception of the body. The tomb is then closed with stones, and the hole leading to it is filled up.

The plain round Mulkutto abounds in game,—antelopes, gazelles (Beni Israel), hares, bustards, and spur fowl; and during the rains the game is said to be still more plentiful. The coast rains usually commence in December, but there is no great fall; and this year, beyond one drizzling morning, on the 15th, there has been no rain up to the end of the month. At Mulkutto the thermometer ranges, in the day time, from 84° to 90°, from December 12th to 18th.

II.—MULKUTTO TO HAWÂKIL BAY.

Colonel Merewether and the reconnoitring party left Mulkutto for Hawâkil Bay on the 21st of October, and returned on the 30th. The road leads for the first 15 miles along the shore of Annesley Bay; and at the ninth mile, where the hills come close to the beach, are the hot salt springs of Atofeh. Thence to Arafali, at the head of Annesley Bay, the road is over a narrow plain, less than a mile broad, crossing small beds of torrents. Arafali is a village consisting of a few grass huts belonging to the Rassamo tribe, who are engaged in the salt trade from a small lake on the Buré Peninsula. There is an outpost of 100 Egyptian troops from Massowa, in an entrenched position, near the village. Good water is found by digging, and there are several wells. Close to the sea there is an extinct volcano with a double crater, 100 feet deep and 300 across; and scoria and pumice are scattered over the plain. From Arafali onwards volcanic action is apparent in every direction.

From Arafali to Booeah (the next halting-place) the distance was found to be 21 miles, thence to Mabileh, 25, and thence to Ramote 10. After leaving Arafali the way leads over a plain called Wongurboo for 3½ miles, where ostriches and antelopes were seen. Another plain follows, 5 miles in extent, called Gallatee, which is intersected by many dry beds of torrents, and overgrown with tamarisk and acacia. After crossing the Gallatee plain the road leads for 3 miles along the bed of a torrent, and then up a rugged path to a plateau called Dhan, covered with loose stones. A descent of 200 feet brought them to the Dharowlee River bed, where there was a well of very fair water, and to the eastward they could see a high hill called Alut,

which was said by the natives to be an active volcano, and to be actually smoking on the other side.

From Ramote the way leads over irregular stony ground, with high hills on either side, to the low land through which the river Ragolay flows, in an alluvial plain covered with salicornia bushes and coarse tufts of grass. The Ragolay was found to be at this point a clear running stream of excellent water. Here they saw traces of wild elephants. From this point the party followed the downward course of the Ragolay, crossing the river forty-eight times, to a place called Lower Ragolay, a distance of 14 miles. Lower Ragolay was found to be 193 feet below the level of the sea.

The Ragolay ravine belongs to the Belessua branch of the Afar tribe; and at Lower Ragolay the chiefs came in to pay their respects to Colonel Merewether. The people were very friendly, but the Chiefs explained that they had little control over them, and that it was necessary for a man to have murdered or mutilated some one before he could obtain the hand of a woman of the tribe. Strict orders were, therefore, issued against straggling.

After leaving Lower Ragolay the party came to the extreme northern limit of the great salt plain, which extended to the south as far as the eye could reach. The ground was white with incrustations of salt.

From Ragolay, their southern limit, the party was returning north-east towards Hawâkil Bay; 30 miles to wells at Gairse Loyola (195 feet above the sea), and 19 more to Rasa, a village on the shores of the bay, opposite the island of Boka. From Rasa they returned to Annesley Bay in a steamer.

The temperature during the journey ranged from 101° to 110° Fahr.

The whole of this region has been under the influence of volcanic action, the evidence of which was observed at every turn. But the most valuable discovery that was made was the nature of the Ragolay River system. It was ascertained that the eastern drainage of the whole of the Abyssinian watershed from Senafè to Atsbi (called on the maps Atebidera) consisted of tributaries of the Ragolay River. These two places are about 70 geographical miles from each other. The River Mena (called Mai Muna on the maps) receives the drainage of Senafè and other plains, and forms the Endayly river, which falls into the Ragolay. Further south the river, called Ouret on the maps, receiving streams from the beautiful vale of Omfeito, and from other valleys nearly to Atigerat, flows past the mountain of Gondagonda, and forms the River Lasguddy, another tributary of the Ragolay. Still further south, between Atigerat and

Atsbi, two other rivers—the Gursuf and Gabala—receive the drainage of the eastern slopes of the Abyssinian Alps, and likewise go to swell the Ragolay.

Thus the Ragolay is an important river-system; and at the point where the reconnoitring party reached its banks it was a perennial running stream, in spite of thirsty sand and a scorching sun. Afterwards, in flowing towards the sea, it descends into a depression 193 feet below the sea-level, which was probably caused by some violent volcanic action; and its waters are finally dissipated by evaporation under the intense heat of a scorching sun, and by absorption in the sand.

To the southward of Atsbi the streams flowing to the east appear to be lost in the great salt plain, which may be looked upon as occupying the place of a vast lake without an outlet. Such a lake would, under similar circumstances, no doubt exist in a less burning climate; but here the intense heat of the sun gives rise to such rapid evaporation that no moisture remains, except a swamp here and there, and the ground is left with an incrustation of salt.

Opportunities will be taken, during the march of the field force along the watershed from Senafè to Atsbi, of completing the examination of the tributaries of the Ragolay to the eastward; and possibly, if any of the ravines through which they flow afford tolerable roads, it may be deemed advisable to open another line of communication by the Ragolay to the sea at Hawâkil Bay.

III.—THE TEKONDA PASS.

The most important duty of the reconnoitring party, under Colonel Merewether, was to discover the best approach from the coast to the Abyssinian table-land; and the first that was examined was the gorge through which the River Hadas flows, called the Tekonda Pass, from the village at its summit. The gorge of the River Alliguddy, which unites with the Hadas in the plain, is said to form an excellent pass, but it emerges on the table-land too far to the north; the Alliguddy flowing west and east, while the Hadas comes from the south.

IV.—THE SENAFÈ PASS.

The Senafè Pass was first discovered and examined by Colonel Merewether and the reconnoitring party early in November; and they finally led the advanced brigade up it, and encamped at Senafe, on the Abyssinian table-land, between the 1st and 6th of December. I went up the pass with Sir Charles Staveley and his Staff between the 20th and 22nd of December.

Komayli, at the entrance of the Senafé Pass, is 10 miles 6 furlongs S., 76° W., from the camp at Mulkutto. Here the dry bed of the Nebhaguddy torrent, which flows down the pass, debouches on the plain, and the drainage-line passes on towards the sea, some miles to the southward of the bed of the Hadas. Komayli is 433 feet above the level of the sea, and here there are abundant supplies of good water from wells.

The road enters the pass immediately on leaving Komayli, and winds up the dry bed of the Nebhaguddy to Lower Sooroo, a distance of 8 miles. In several places the alluvial deposit brought down by the torrent was from 10 to even 20 feet thick. The pass winds very much, and is narrow, while the gneiss mountains rise up perpendicularly on either side. In this part the vegetation is like that of the coast plain — acacias, with a few calotropis trees. At the end of 8 miles the narrow part of the pass is reached, at a place called Lower Sooroo, where the running water which flows from Upper Sooroo, a distance of 4 miles, is lost. The volcanic action which has disturbed the whole of this region, is very distinctly visible in this pass. At Lower Sooroo the gneiss cliffs are perpendicular on the western side; and in one place a vertical crack, some 5 feet in width, is filled in with a black volcanic rock. The eye is caught by it at once, and it looks like a broad black mark painted on the face of the cliff, from the summit to the base. At Lower Sooroo the road turns sharp to the right, and enters a very narrow pass at Middle Sooroo, not more than 50 to 100 feet across, with cliffs on either side rising to a height of upwards of a thousand feet, while the pass is blocked up by gigantic boulders of gneiss, heaped together in wild confusion for a distance of 250 yards. The scenery here is magnificent. At Upper Sooroo, which is 12 miles and 2 furlongs from Komayli, the pass opens again, and the water is excellent and plentiful. The total length of the running stream, from its source to where it disappears at Lower Sooroo, is 4 miles.

I found the boiling point at Upper Sooroo to be 207·50°, and the aneroid showed 27·61 inches, which gives an elevation above the sea of about 2520 feet. The latitude by meridian altitude of **Capella* was 15° 1′ 52″ N.

We left Upper Sooroo in the night, and got over the first 10 miles before dawn; but I was informed that, at a distance of 8 miles, there was water up a ravine called Barutguddy (2640 feet above the sea), and again at another place called Sonakte, 2 miles further on (3234 feet above the sea). Between Upper Sooroo and Barutguddy there are two tributary torrents on the right hand side of the pass, and on the same side, a little beyond

Sonakte, the bed of the Mudhullo torrent forms a difficult communication between the Senafé and Tekonda passes.

Near Sonakte the gneiss ceases, and a dark, schistose, metamorphic rock, with strata thrown up at angles of upwards of 70°, takes its place, apparently overlying it. It was observable that, whenever there was running water, the strata were nearly horizontal and but slightly tilted, while the waterless tracts were met with where the strata were tilted at great angles. At a distance of 12 miles 5 furlongs from Upper Sooroo, at a place called Maiyen, a well has been dug, and a mile further on the pass opens out, and there is a plain which the reconnoitring party named after a bevy of guinea-fowl they put up there. Here the first *kol-quall*, or candelabra-trees (Euphorbia), which are described in such enthusiastic terms by Bruce, are met with. Their upright branches, clustering close together, of a bright Araucaria green, certainly have a very fine effect amongst the brushwood. There are also large beds of aloes on the plain. To the right a view of the plateau of Abyssinia, with scarped cliffs, apparently only distant about 4 miles, is obtained through an opening in the cliffs.

Further on the scenery in the pass becomes very fine, the cliffs higher, with peaked mountains towering up behind them, and the vegetation richer and more varied. The strata of the schistose rocks are here not only tilted at great angles, but crumpled into irregular waves, and where there are veins of quartz, the two kinds of rock are torn away, leaving gaping cracks and fissures. Very fine trees of the fig tribe, peepal, banyan, and sycamore figs grow in this part of the gorge, with the feathery tamaric, tamarinds, jujub-trees, and an undergrowth of mimosa, lobelia, and solanum. The pass winds in and out amonst the mountains, and at one lovely spot the cliffs approach within 40 feet, while the foliage of 4 or 5 venerable banyan-trees overshadows the road. In some places there was a perfect plague of locusts, which rose from the ground in myriads as we approached, their innumerable wings making a loud crackling noise. Monkeys are numerous in the pass, and the carcasses of many dead mules have attracted a host of obscene vultures.

The distance from Maiyen wells to the next water at Raha-guddy is 16 miles, 3 furlongs; but there is a little water after rains at a place called Henderta, only 11 miles from Maiyen. The whole distance from Upper Sooroo to Raha-guddy is an excellent natural road with an easy gradient, but at Raha-guddy it again narrows, and some labour is required to make it passable for wheeled traffic.

At Raha-guddy, where there is a good supply of running

water, the flora becomes more alpine. There is turf by the road side, tall, handsome, juniper pines, wild olives, several mimosæ, peepul, banyan, and sycamore, figs, kol-qualls, jujub-trees, an evergreen bush with a sweetly scented flower (*Myrsine Africana*), lobelia, solanum, and wild thyme, while a graceful clematis climbs over the trees. I climbed to the top of a hill above Raha-guddy, with Sir Charles Staveley, and obtained a splendid view. To the south and west is the edge of the Abyssinian table-land, running in almost a straight line, with scarped sides of white sandstone. The mountain ridges or spurs, between which the passes wind, appear to run off from the table-land at right angles, but afterwards turning to the north, and throwing up peaks here and there. They then wind away in a northerly direction, but very tortuously, with deep ravines between them. It appeared, from our point of view, as if there was a deep natural trench between these mountain spurs and the ascent of the table-land.

I found the boiling point at Raha-guddy to be 200·80, and the aneroid showed 23·84, which makes the elevation above the sea about 6300 feet. The latitude by meridian altitude of * *Capella* 14° 45′ 52″ N. Temperature at 11 P.M. 59° Fahr.

Senafé, on the Abyssinian table-land, is 8 miles from Raha-guddy, 5 to the foot of the ascent, 1½ the ascent, and 1½ across the plateau. The length of the gorge, from Komayli to the foot of the ascent to Senafé, is thus nearly 46 miles. The ascent up the sloping rocky side of a hill is by no means difficult; and the plateau of Abyssinia is thus reached. I have been in the Alps and Pyrenees, have walked or ridden up nearly every pass in the Western Ghauts of India from Bombay to Cape Comorin, and know most of the passes in the Peruvian Andes, and I confidently affirm that in none of these ranges is there any natural opening which is so easily accessible as that from Komayli to the highlands of Abyssinia. One peculiar feature in these Abyssinian mountains is that the passes leading through them have easier gradients, and are altogether more readily surmounted than those of almost any other mountain range in the world.*

The reconnoitring party have gone over the ground, on the table-land, between Senafé and Tekonda, a distance of about 9 miles, and have thus connected their surveys of the two passes. Parties of sappers, and a Belooch regiment, are at work on the narrow parts of the Senafé Pass, at middle Sooroo and Raha-guddy, and very soon there will be a good road throughout. The line separating the region of mountain and coast rains is at

* The Bolan Pass is perhaps as easy.

or near Upper Sooroo. Above that line the heavy rains of the Abyssinian highlands begin to fall in June, and it is apprehended that the swollen torrent will then render the gorge impassable. But the area of drainage appears to me to be too small to justify this apprehension, while the growth of trees in the torrent bed seems to indicate that such floods are at least not of annual occurrence. The Senafé Pass is flanked by the Tekonda Pass on one side, and by another ravine on the other, so that the side drainage is confined to the rain-fall on the almost perpendicular sides of the flanking hills. Nor is there a larger area of drainage from the plateau, as the streams at Senafé and its vicinity go to swell the Ragolay system. If floods occur at all they must be merely the rush of surface drainage over a comparatively small area, after some exceptionally heavy fall, and must be sudden and of very short duration—the water rushing rapidly down the gorge. However all this remains to be proved.

V.—SENAFÉ.

The camp at Senafé is pitched on a plain surrounded on every side but the south-west by an amphitheatre of sandstone hills and rocks. This sandstone seems to overlie the metamorphic rocks in the pass, and I am informed that all the table hills towards the south and west are of the same formation.

I found the boiling point at Senafé to be 198·00°, and the aneroid showed 22·56 inches, giving the elevation above the sea at 8332 feet. The latitude by meridian altitudes of the Sun and **Capella* 41° 14′ 52″ N., and the longitude by D. R. 39·31° E. All the longitudes will be accurately fixed as soon as the electric telegraph is brought up to Senafé.* At this time of year the sky is usually cloudless, except at dawn when the fleecy mists roll up the passes; and the sun is hot during the day, the temperature ranging from 68° to 78°; but the bright starry nights are cold, the minimum descending as low as 45°.

The plain is covered with grass or stubble barley fields, and dotted with stunted juniper pine, with thyme, and other bushes. The head of the pass is a mile and a half over the plain, a few points to the eastward of north, and nearly due north is the lofty scarped hill called Arabi Teleeki. I climbed to the summit to get a round of angles, and found the boiling point to be 196·05°, the aneroid showing 21·60 inches, which gives an elevation of 8561 feet above the sea, and 1097 above the camp. A ridge covered with flowering bushes, the pretty *Myrsine* being

* Unfortunately there was not time to fix the longitudes by telegraph, and it was not done.

most common, extends from Arabi Teleeki until it bears N.W. by W. from the camp, where there is an opening—the beetling cliffs of the Adana rock rising up on the other side. Here, at a spot where wild thyme and *Myrsine* bushes cluster round mighty boulders of rock, with intervals of soft turf, there is a wide view over the valley of the Hames to the north-west, with flat-topped mountains rising one above the other, in the far distance.

The village of Senafé is at the foot of the grand mass of sandstone rock about half a mile north-west of the camp, called Amba-Adana. It consists of about a dozen houses built of rough stones and mud, with flat roofs—branches being placed in rows across the beams, and covered with mud. Broken jars plastered into the roof, serve as chimneys. The outer door, very roughly formed, with wooden posts and lintel, leads into a large outer hall, the roof of which is formed of timber pillars. This serves as a stable for cattle and goats, while a mud platform, along one side, is the sleeping place for servants and guests. Doors lead from this hall into two much smaller chambers, occupied by the family. The population of Senafé is about 240. The inhabitants are all Mohammedans; an upright people with good features, but with very black complexions and woolly hair done in plaits. The women are filthily dirty, wearing a leathern petticoat and mantle, and necklaces of beads. The dress of the men differs from that of the Shohos in having cotton drawers—their arms are the same.

Senafé is the last Mohammedan village, all beyond in this province of Shamazano are Christian.

VI.—The Region around Senafé.

Camp, Senafé, January 22nd, 1868.

The long detention of the Abyssinian expedition at Senafé has afforded occasion for a more detailed examination of the immediate neighbourhood of the British camp there than is usually possible for a traveller in passing through a new country. The region thus thrown open to geographical research comprises the southern portion of the great Tigrè province of Akula-Guzay. I propose to submit a sketch of the physical geography of this region, which is specially interesting from its containing the base of operations of the British force, on the Abyssinian plateau.

The southern half of Akula-Guzay (comprising the districts of Shumazano, Wudukalee, Tserena, and Gula Mukado) consists of plateau at a general elevation of 8000 feet above the sea, with occasional peaks and ridges rising to a height of 9000 feet and upwards; of wide valleys surrounded by these plateaux at a

height of 7000 feet; and of deep ravines and river basins elevated from 6000 to 4500 feet above the sea.

The plateaux stretch from north to south along the main line of the Abyssinian alps, and form their summit ridge; and they also extend over a considerable area to the westward, dividing the valleys from each other. In describing the passes leading from the plateaux to the sea-coast, I mentioned that the lower rocks were gneiss; above which came a mica schist, with veins of quartz, tilted at an angle of at least 70°; and that the schistose rock was overlaid unconformably by a deposit of sandstone. The plateaux, which I am now endeavouring to describe, are composed of sandstone overlying the same tilted strata as are visible in the pass; and they present a very remarkable appearance when viewed from the valleys which they enclose. Their summits form a perfectly straight level line, and their sides, from the top to a depth of 50 to 100 feet, are scarped sandstone cliffs, but below these cliffs the schist rocks, more or less disintegrated at the surface, form hill sides which slope down more gradually to the valleys. Several flat-topped peaks rise from the plateaux, the most remarkable of which are Arabi Teleeki (two miles north of the camp at Senafé), which I found to be 9600 feet above the sea; Gonzobo, some miles to the westward of Senafé, and Sowayra about $7\frac{1}{2}$ miles to the eastward. I was unable to effect the ascent of Gonzobo owing to the disturbed state of the country in that direction; but I made a successful expedition to the summit of Mount Sowayra, under the guidance of a chief of the Gaso Shohos. Sowayra consists of a range of lofty sandstone cliffs on the verge of the plateau overlooking the Senafé Pass, and from one point we could see the tents of the Belooch regiment at Raha-guddy in the pass below. We had to select the loftiest part of the ridge for ascent, and, after a hard climb over projecting rocks and along narrow shelves, we reached the summit. Here I found two small rocky table-lands, divided by a slight depression, and I proceeded to observe the altitude on each, with the following results:—

Mount Sowayra. No. 1:—	
Boiling point	195·05°
Aneroid	20·86 inches.
Height	10,328 feet.
Mount Sowayra. No. 2:—	
Boiling point	195°
Aneroid	20·80 inches.
Height	10,350 feet.

The sandstone of Mount Sowayra is much stained with iron, and near the summit I came upon some thin flakes of lime.

The plateau, from which Sowayra rises, is intersected by deep wild glens overgrown with juniper; the drainage flowing to the Shumazano valley and away from the Senafé Pass. But, in January, the torrent beds are all dry, and only in one place did we find a few pools of stagnant water.

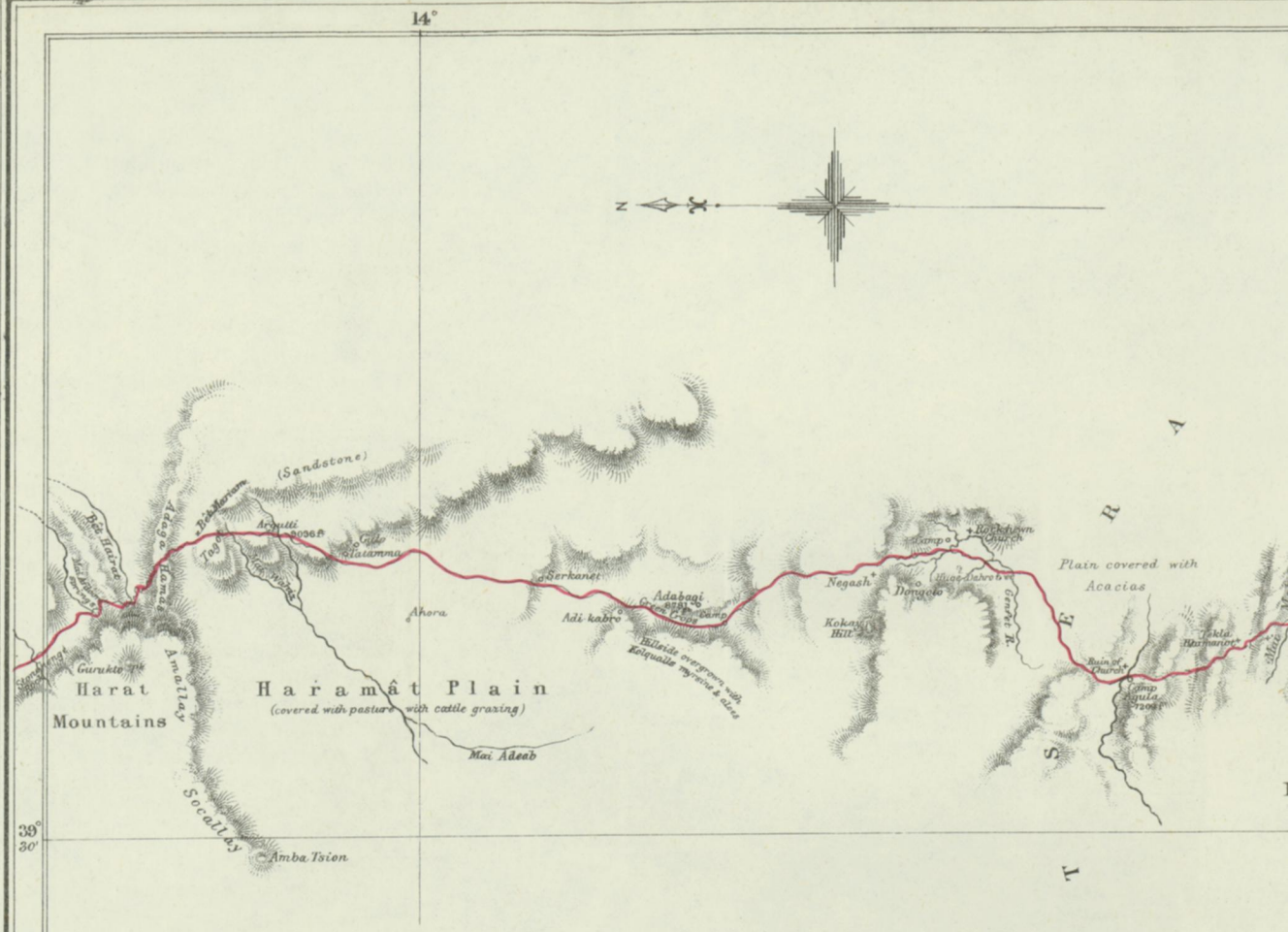
The second great feature in this region is the valleys which are surrounded by the loftier plateaux. The chief of these is that of Shumazano, 7000 feet above the sea, and about 5 miles long by 4; at the north-east corner of which is the British camp, pitched under the grand sandstone peaks and precipices of Senafé.* The edges of the tilted strata of the schist rock, at an angle of 70° from north-west to south-east, crop out in every direction over the valley with veins of quartz. The shallow soil is composed of the disintegrated rock, and is covered with stones and pebbles of white quartz. Here and there the rock rises up and forms isolated conical hills, upon which the villages are built; but wherever these hills rise above a certain height, as in the case of the lofty peak of Saim at the western end of the valley, the summits are capped with sandstone. This upper sandstone deposit has thus been washed away in the valleys, until the schist which underlies it is exposed, while it remains to cover the plateaux and cap the isolated peaks which rise from the valleys. The schist is first met with in the Senafé Pass, at an elevation of 3000 feet, and it is overlaid by the sandstone at about 7000 feet, so that the perpendicular depth of this formation must be about 4000 feet. Considering the angle at which the schistose strata are tilted, and the ease with which water can penetrate down them, owing partly to the frequently recurring veins of quartz, I should be inclined to think that no water would be found except at enormous depths below the surface. Thus the whole distance from Raraguddy to Maiyen well (in the Senafé Pass) is devoid of water, while at the latter place, and at Upper Sooroo, in the neighbourhood of which points the schist rock rests upon the gneiss, fresh water appears again. The Shumazano valley is watered by surface drainage. The population of the 16 villages in this valley, including Senafé, is about 5000 souls;

* Dr. Beke states that there was a Greek station at Senafé, but I have searched and inquired in vain for any ruins. The name bears out the tradition of the inhabitants of the village, that it was founded by people coming from Sana, in Yemen, 400 years ago. When General Merewether, and the reconnoitring party, ascended the high plateau near Tekonda, called Koheito, they found ruined walls and columns on Mount Tsaro, the highest part. This, it seems probable, and not Senafé, was the position of the Greek depôt, on the verge of the Abyssinian plateau. The way to it, from Adulis, was probably by the Senafé Pass, as far as the Mudhullo Torrent, and then by that torrent bed, which leads direct to Tsaro, and on to Tekónda and Axum.

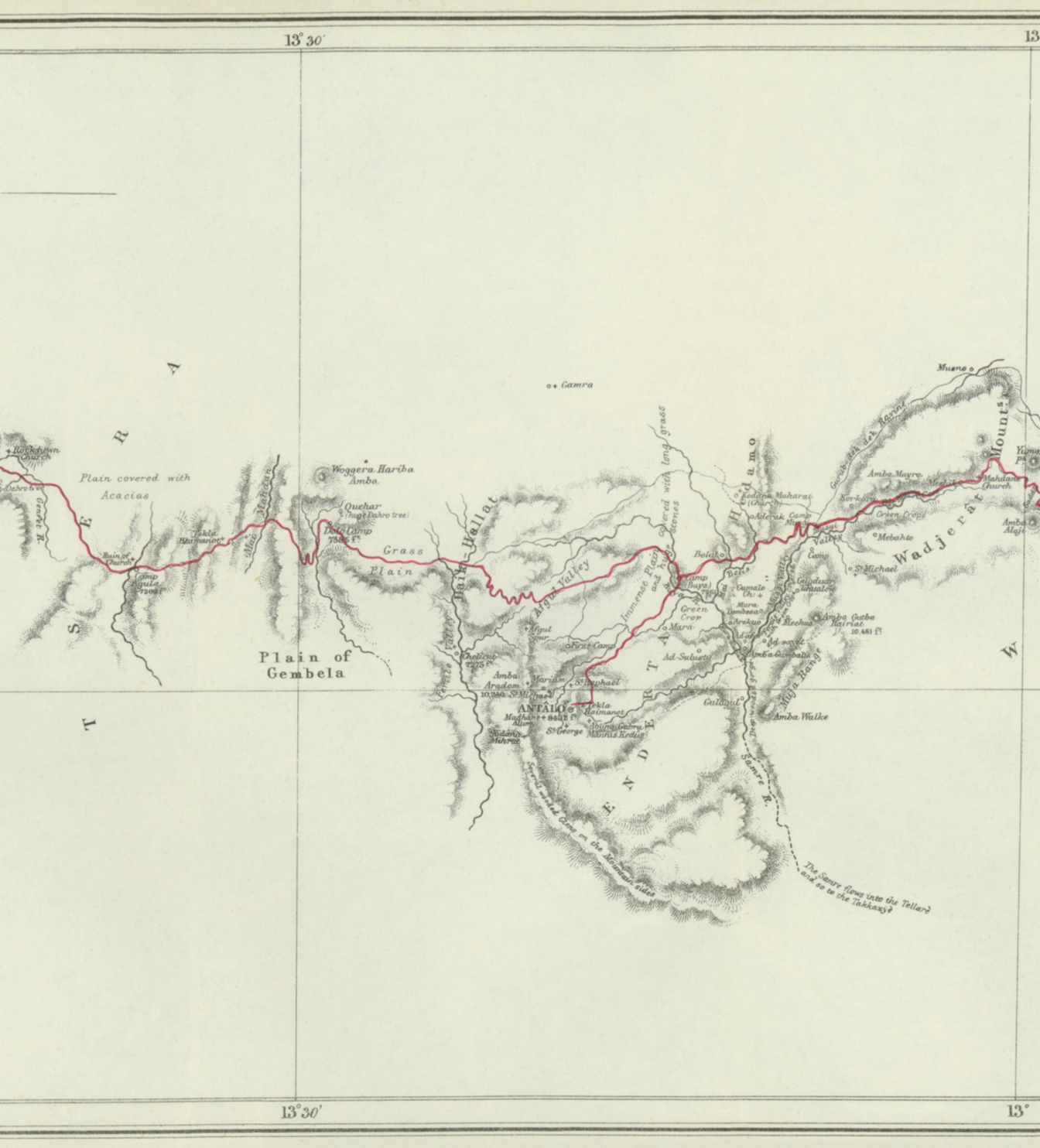
and the extent to which their resources are being drawn upon by the English Commissariat may be imagined when, from January 1st to 15th, 60,000 lbs. of barley and 200,000 lbs. of grass have been purchased. It is true that some of this comes from the neighbouring valley of Mai Mena. The Mai Mena, in its general features, resembles the Shumazano valley—except that, on its western side, there are long, deep, and very picturesque gorges with perennial streams of delicious water forming deep pools amongst the giant boulders of sandstone. This difference may be caused by the increasing rainfall in the rainy season as we advance westward.

The third great feature in the region, the geography of which I am describing, is the deep ravines and river beds, which carry off the drainage on the one hand to the River Mareb and on the other to the coast of the Red Sea. The valley of the Mena was explored for some distance by Captain Pottinger of the Quartermaster General's Department, in the beginning of the present month. He ascertained that the Mena flowed into the Endayly, a principal affluent of the Ragolay, but the complete exploration of this river system was prevented by his small party being stopped by a truculent tribe of Shohos (the Hazo). The Hagir gorge conducts the drainage of the Shumazano valley and surrounding plateaux to the Ragolay, while the steep northern slopes drain into the Senafé Pass. But the deepest and grandest gorge is that of the Hamas, in the Mareb River system, immediately to the westward of Senafé. The Senafé rocks rise from the plain on their eastern sides, but to the westward they tower over a rapid declivity which descends to the Hamas gorge. This declivity is entirely of schistose rock, the Senafé cliffs above alone being of sandstone. But it is cut up by deep watercourses which are filled with gigantic masses of sandstone hurled from the cliffs above. These boulders form deep caves, the lurking places of panthers and hyænas. I know not whether to give the palm to the view looking down from the Senafé cliffs over the Hamas gorge, with the wild masses of mountains beyond, bounded by the dim outline of the peaks near Adowa; or to the view upwards from the gorge, with the fantastic peaks and dizzy precipices, and the crowds of lordly eagles and more humble kites wheeling in circles above them. I found the elevation of the Hamas gorge, just at the foot of the declivity, to be 5850 feet above the sea, or 1600 below Senafé. There is no water in the Hamas at this season, but, in the rainy season, it drains into the Tserena, a tributary of the Bellesa, which is an affluent of the Mareb.

One of the most interesting points for observation in this alpine region is the character of the vegetation with reference to



LINE OF MARCH
FROM
ADIGERAT
TO THE
RIVER TAKKAZYÈ



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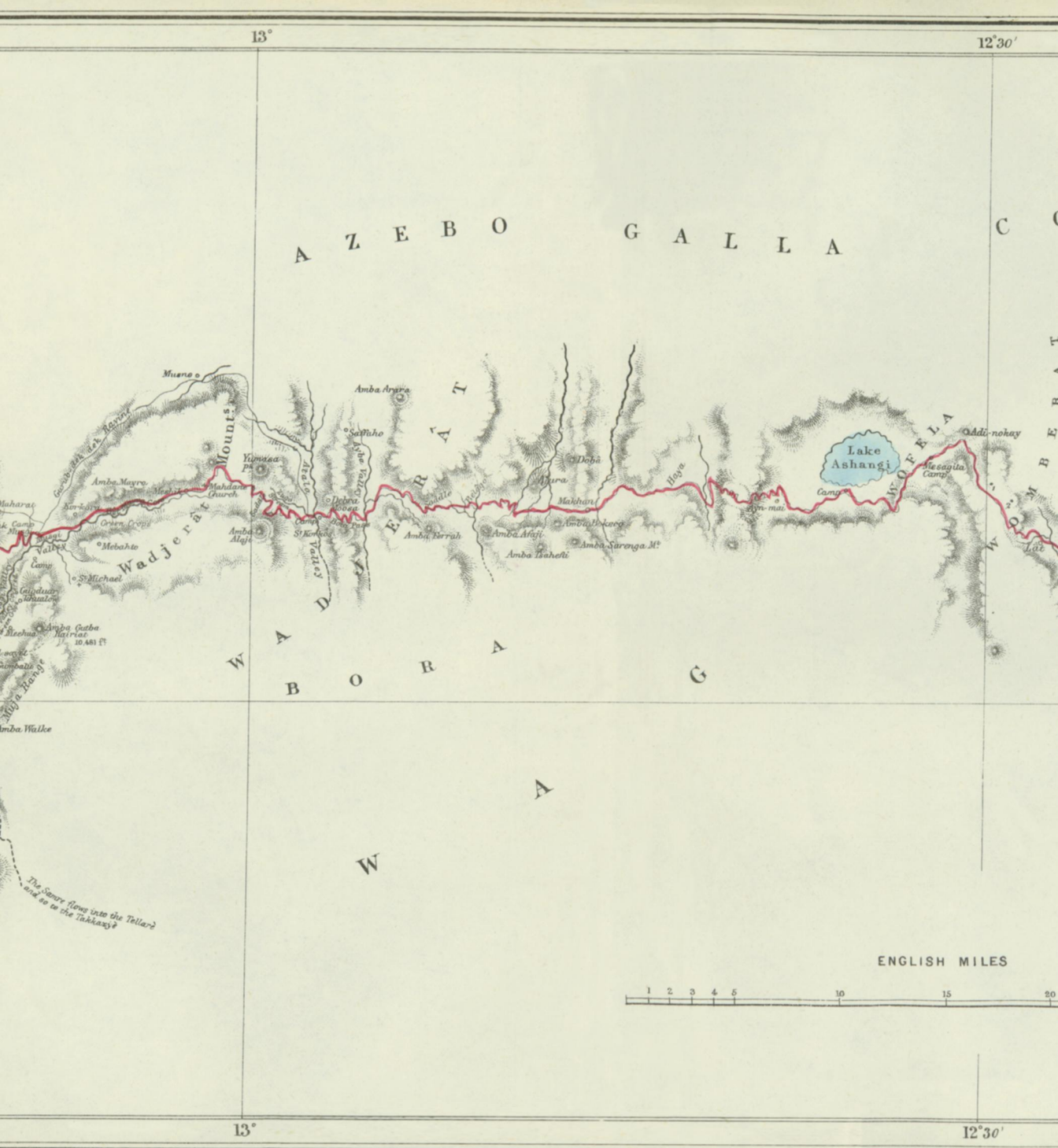

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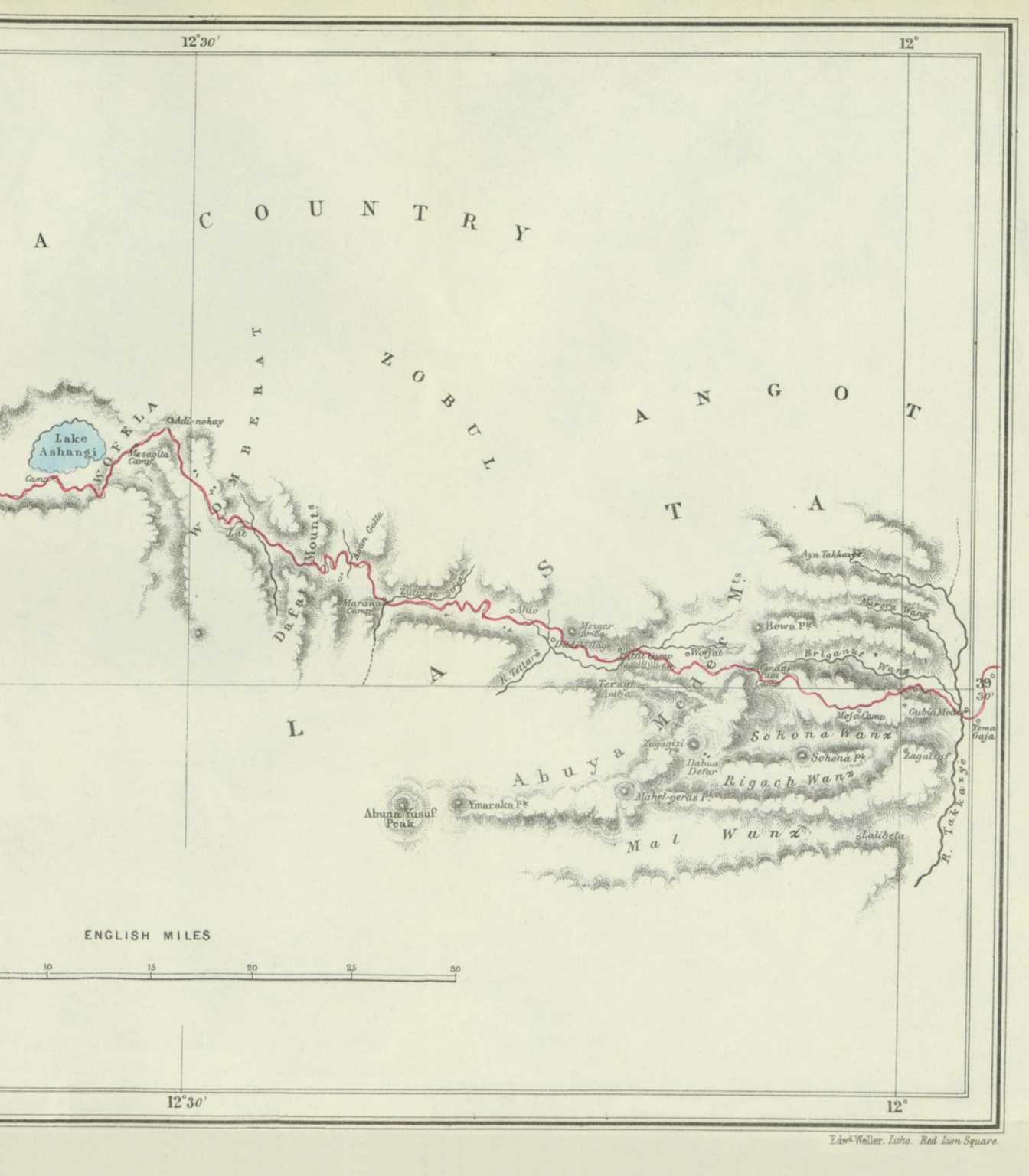


Edwd. Weller, Litho. Red Lion Square.

zones of elevation, from the Hamas gorge at about 6000 to the top of Sowayra at 10,300 feet—a perpendicular height of more than 4000 feet. On the summit and slopes of Sowayra the *flora* is of a thoroughly temperate, and even English character. The only tree is the juniper, while the most common plants are lavender, wild thyme, dog rose, violets, cowslips, and compositæ. The sandstone plateaux have the same *flora*, but on the lower slopes of the hills bounding the valleys it is enriched by many trees and shrubs of a warmer clime. Italian here mingles with English vegetation. In the lovely gorge of Baraka, on the western side of the Mai Mena valley, which is rendered sacred by the shrine and church of the Abyssinian saint Romanos and his fellow martyrs, masses of maiden hair fern droop over the clear pools of water, and the undergrowth consists of a *Myrsine*, a large lobelia, and solanum. At this elevation the vegetation akin to that of the Bombay ghauts commences. Huge and venerable *dahro* trees (the representative of the Indian banyan) grow near the villages, and afford shelter for flocks of pigeons; and tamarinds, mimosæ, jujub, and oleander trees appear in the ravines. But the English types, so plentiful round Mount Sowayra, do not descend lower than Raha-guddy—6000 feet above the sea—and they disappear altogether in the Hamas gorge, where there is nothing but acacias and mimosæ. Thus the temperate flora may be said to extend over a zone from 10,000 to 6000 feet above the sea, the sub-tropical from 6000 to 3000, and the dry tropical coast vegetation from 3000 to the sea. The open elevated valleys are, as a rule, bare of trees, the dahros and acacias only occurring in sheltered places near the villages, although the loftier plateaux are pretty thickly covered with low juniper trees overgrown with clematis.

A series of meteorological observations carried on during only one month can give no idea of the climate; but it appears that the cold nights and warm cloudless days of the dry season are succeeded, from May to September, by rains more or less heavy, which convert the dry pastures into swamps, and fill the water-courses with torrents. The water, however, for the most part, rushes rapidly off in surface drainage. The prevailing wind, in December and January, at Senafè, is easterly.

VII.—Senafé to Antâlo.

Camp at Buya, near Antâlo, February 24th, 1868.

The country between Senafé and Antâlo forms the watershed of the river flowing off to the Red Sea coast, on the one hand, and of the feeders of the Mareb and the Nile on the other. The

distance between the two places by the road is 120 miles—the route taken by the British army being as follows:—

	Distance.*			Corrected Course.
	Miles.	Fur.	Yards.	°
Akula Guzay—				
Senafé to Barakit	7	3	115	S. 11 W.
,, Goona-goona	5	0	0	S. 24 W.
Agamé—				
Senafé to Mai-musrab	7	3	96	S. 41 W.
,, Focada	6	0	139	S. 13 W.
,, Khursabur	5	2	173	S. 31 E.
,, Adigerat	5	3	81	S. 8 E.
Haramât—				
Adigerat to Mai Wahiz	12	0	0	S. 24 E.
,, Adabagi	14	4	0	S. $9\frac{3}{4}$ W.
Tsera—				
Adabagi to Dongolo	9	2	0	S. 11 W.
,, Agula	8	0	0	S. $24\frac{1}{2}$ W.
,, Mai Makdan	7	2	0	S. 27 W.
Enderta—				
Mai-Makdan to Dolo	6	4	0	S. 25 W.
,, Haik-hallat	8	2	0	S. $24\frac{3}{4}$ W.
,, Afgul	4	0	0	S. 62 W.
,, Antâlo (camp on Buya River, 4 miles S. of town)	7	0	0	S. $21\frac{1}{2}$ W.
	113	1	604	

In my previous paper I described the region round Senafé, including the valley of the Upper Mena, and the romantic glen of Baraka. On the southern side of the Mena a lofty chain of mountains rises up very abruptly, and forms the water-shed. The road ascends to the wide plain of Gullaba, on their western flank, from a beautiful little valley enclosed between precipitous cliffs, where a bright stream falls from a height of 150 feet into a copse of scented shrubs, irrigates an expanse of barley cultivation at the village of Goona-goona, and empties itself into the Mena. At this point the schistose rocks entirely disappear from the surface, and nothing but sandstone is seen as far as Adigerat.

At Goona-goona (2 P.M.):—

Boiling point	198·8°
Aneroid	22·74 inches.
Temperature	79°
Height above sea	8227 feet.

From the plain of Gullaba there is a fine view of the Adowa

* Straight, from point to point.

mountains to the westward, and of the well-defined peaks round Senafé to the north. The plain is covered with long tufts of grass and *myrsine* bushes, and abounds in game, hares, spur-fowl, and quail. At the southern end of the plain there is a depression forming a narrow ridge, which is the exact water-shed of the country, the drainage on one side going to the Mareb, and on the other to the Ragolay, within a few feet of each other. The eastern streams still flow to the Mena; and, looking down the valley of Mai Musrub, the deep gorge of the Wudharsha stream could be seen beyond, with the overhanging cliffs which bound it overlapping each other far away into the eastern distance. High above all towers the flat-topped *amba* of Debra Matso, the stronghold of the Sabagadis family. A few miles further on the high scarped mountain of Focada intersects the plateau, and the road is taken round its western end, on the very edge of the cliffs, whence there is a most remarkable view, which at one glance furnishes a good idea of the physical features of this part of Abyssinia.

The spectator, standing at the foot of the Focada mountain, and looking to the westward, has before him, at his own level, an apparently interminable plateau with peaks and hills, such as that of Focada, rising out of it. But the plateau is also deeply cut into by valleys of considerable width and great depth. From his very feet the hills descend, first as perpendicular cliffs, and then with sloping sides overgrown with trees; and far below there is the fertile valley of Mareta, with its villages and green crops. But the most remarkable feature of the landscape remains to be described. Just as peaks rise from the surface of the plateau, so hills rise up out of the valleys, with sides exactly like those descending from the plateau, and with flat-topped summits corresponding exactly with the plateau-level. One of these *valley* hills is the famous *amba* of Debra Damo, famous in the history of the Portuguese expedition of Cristofero da Gama. The general effect is most striking; it gives the idea of a dead level plain which had been cut into by floods forming ravines and valleys, but leaving portions of the plateau in their midst as islands, just as navvies leave earth pillars to measure the depth of their excavations.

After rounding the Focada mountain the road crosses a grassy plain, and begins to skirt the eastern side of the watershed. Here an important knot of mountains begins to rise from the plateau, which ends in an abrupt wall about 20 miles further south. It is called the Harat range, and is one of the chief mountain roots (stock-gebirge) of Tigrè; as its western half forms the dividing point of the waters flowing to the Mareb on

the north, and the Nile on the south. I have only seen its eastern and southern sides.

Just beyond Focada, and at the commencement of the Harat hills a little stream, called Kai Korkos, pours over a cliff into a thickly wooded ravine, the view from the top extending far away over hills and valleys to the eastward. Four miles further on is the steep descent of Khursabur, and another five miles in an easterly direction completes the march to Adigerat.* The Harat hills increase in elevation to the southward—and Adigerat, a ruined and half deserted town, with a large church and ruined palace to tell the tale of former prosperity—nestles at the foot of the Aloquor and Undale peaks, which are upwards of 11,000 feet above the sea.

The Khursabur ridge, an eastern spur of the Harat, separates the eastern drainage, the streams to the north of it being tributaries of the Mena, while to the south the water converges to form the Ouret. The Mena is a tributary of the Endayly, and the Ouret of the Lasguddy, both main tributaries of the Ragolay. The fertile plain of Adigerat is, strictly speaking, a wide terrace at the foot of the lofty Harat mountains, whence deep ravines lead off the drainage to the Ouret valley. At the same time there are abrupt scarped ridges of sandstone on its eastern side, which are cut through at intervals to allow the escape of the Harat drainage. I made the following observations at Adigerat (6 P.M.):—

Boiling point	197·9°
Aneroid	22·27 inches.
Temperature	61°
Height above the sea	8585 feet.
Latitude by meridian altitude of ⊙	14° 16′ 26″ N.
Variation and deviation by azimuth observations	9° 11′ W.
Longitude by D. R. (distances chained)	39° 35′ 30″ E.

The vegetation of Adigerat is much the same as at Senafé, but water is more abundant, and where the springs issue from the hills there are wooded glens containing many tall trees, most of them belonging to the fig tribe. The *kol-qualls* attain to a great height, there are thickets of jessamine and dog-roses, and the plain is covered with an aloe having a bright orange flower, the same, M. Munzinger informs me, as is known in medicine by the name of the Socotrine aloe.

To the eastward of the Adigerat plain the ground is broken up into profound ravines sloping off to the eastward, with their scarped sides sometimes forming magnificent cliffs, and ter-

* The capital of the province of Agamé, and once the favourite residence of Sabagadis, who was ruler of Tigrè from 1813 to 1831.

minating in *ambas*, or natural fortresses—a country well adapted for the wild lives led by the turbulent and usually outlawed musketeers of Agamé. In the Ouret ravine the rock underlying the sandstone crops out, and appears to be a coarse granite, with veins of quartz. The sandstone is very full of iron, and, for the purpose of testing the deviation of the compass, I took a careful bearing of a tent in camp from the top of an *amba* called Sebanbat-falasso, and another from the tent to the amba. The difference between the two bearings was 3°. From the above *amba* there is a distant view of the lofty peak of Goonda-goonda to the eastward, round which the Lasguddy river is said to flow, and beyond it the mountains rapidly slope away into the coast country of the Shohos.

There is a very curious formation a few miles south of Adigerat, which is worthy of mention. A conical hill rises out of the plain, and on the summit there is a mass of very coarse-grained sandstone, forming two rough columns and a lintel. The doorway thus formed is perfect; at a distance it might easily be mistaken for the work of man, but on a nearer approach its massive proportions, and the fact that the door-posts are a part of the hill itself, show that nature alone could have been the workman.

At the southern end of the plain of Adigerat, four miles south of the town, a ridge jutting out from the Harat range separates it from a ravine converging to the Ouret, there is yet another ravine belonging to the eastern drainage system, and then a steep rocky ascent leads to the summit of a ridge at the extreme south-east angle of the Harat mountains, which forms the dividing line between the Nile and the Ragolay. High above, on the right, rise the beetling cliffs of the Harat, but away to the south-west, as far as the eye can reach, is the rich plain of Haramât, traversed by springs which go to swell the Atbara, the main fertilizing tributary of the Nile.

As the sun was setting we descended the opposite or southern side of the ridge, passed through the gloomy grove of kol-qualls surrounding the ruined church of St. Mary's; and, when our horses' feet sunk in some black mud by the side of a thicket of dog-roses and jessamines, we realized the fact that at last we were in the basin of the Nile. That swampy ground was the source of the Mai Wahiz ("running water"), a feeder of the Geba, which is one of the main tributaries of the Takkazyè. We had reason to remember our first night in the Nile basin, for the baggage mules were benighted, and we passed the night, a very cold one, round a camp fire, without tents or beds.

Our camp was at Argutti,* four miles south of the ridge

* Argutti is a very fine tree (*Celastrus Senegalensis*), but there are none at this place. Lucus a non lucendo.

(which is called *Adaga-Hamas*, because a market is held there every Thursday); and at daylight, on the morning of February 13th, I took the following observations:—

Argutti (6·13 A.M.):—

Boiling point	196·9°
Aneroid	21·86 inches.
Temperature	43°
Height above the sea	0936 feet.
Deviation and variation by amplitude	8° 21′ W.

The important mountain-knot of Harat ends abruptly at a point about 8 miles south of Adigerat, and from Argutti, which is about 4 miles south of that point, they appear like a mighty wall rising suddenly from the plain of Haramât—bold sandstone cliffs, with flat tops, surmounted here and there by truncated cones, and the higher peaks, such as Aloquor and Undale (over Adigerat), in the interior of the mountain-knot, rising above them. The most conspicuous of these lofty flat-topped cones is the famous Amba Tsion, the great fortress of Haramât, forming the extreme south-west angle of the Harat Range, and bearing N. 88° W. from Argutti. For many and many a mile to the southward it forms a noble landmark.

The plain of Haramât is bounded on the north by the Harat Range. On the east there is a line of sandstone flat-topped hills, extending for some miles to the southward, and sinking into the plain in a succession of wide terraces, broken by steep ravines which are well wooded, with rich pasture and arable land at their bases. Here most of the villages are built, and it is observable that at this point the houses cease to be square and flat-roofed, as in Shumazano, and are circular, with pointed thatched roofs—losing the Arab and having more of the African character.

At the southern end of the plain of Haramât, which is rich in cattle and grain, there are a series of undulating hills, with valleys between. That of Adabagi ("*Sheep Village*") is 14 miles south of Argutti:—

Adabagi (1 P.M.):—

Boiling point	197·75°
Aneroid	22·14 inches.
Temperature	72°
Height above sea	8781 feet.

About two miles beyond Adabagi there is a long and steep descent to Dongolo and the valley of the Genfel, and here the slate-rock again appears, which I had not seen since leaving the Shumazano district, where it underlies the sandstone, and appears in all directions on the surface of the plain. At this point the character of the country entirely changes, so that the

country between Senafé and Antâlo is divided into two distinct regions at the descent of Dongolo, one upwards of 8000 feet above the sea, with the vegetation of the temperate zone; the other little over 7000 feet above the sea, with the dry semi-tropical flora of the upper Bombay Ghauts, but much poorer and scantier. In both the plains are bare of trees, and the vegetation only becomes rich in the sheltered glens; in both the mountain-peaks and plateaux rise high above the average level, and many plants are, of course, common to both.

The scenery on the Dongolo descent and in the Genfel valley is exceedingly beautiful. On the right there is a glorious mass of reddish sandstone cliff, and the lower hills are covered with that mimosa with the crimson pod which glistens under the rays of the sun (common also at Raha-guddy, in the Senafé Pass), with myrsine, and the *Cassia Arereh*, now leafless and covered with bright yellow flowers. A broad running stream flows through the valley, bordered by a kind of asclepiad with milky juice, leaves like an oleander, and milk-white woolly flowers. Here and there venerable dahro trees afford a grateful shade, under their wide-spreading branches. The road crosses the Genfel River, a tributary of the Geba, and enters upon a vast plain covered with stunted acacias, which, if it were not for a fragrant labiate plant interspersed among them, would remind one of the country round Mulkutto. This lower region abounds in camels of a strong active breed. The road to Atsbi, the great salt-market, branches off just beyond Adabagi, and the camels, brought up with salt by the Taltals, are driven to the westward to feed upon the acacias, many finding their way into the possession of the natives, between Dongolo and Antalo. The Mohammedans especially, of whom there are not a few, and who are all traders, are great owners of camels.

Agula is in a valley, 7 miles south of Dongolo, running east and west, with a fine stream of water flowing through it—also a tributary of the Geba. The hills on either side, unlike all those to the northward, are low and round, and are composed of limestone full of fossil-shells and encrinites. From the hills to the westward there is a fine view of this valley, with the winding course of the brook marked by a bright green belt:—

At Agula (5 P.M.):—

Boiling point	200·1°
Aneroid	23·39 inches.
Temperature	75°
Height above sea	7209 feet.
Var., &c., by Azimuth	12° w.

Lat. mer. alt. * Sirius obtained, but not very satisfactory, as the sky was cloudy.

The road from Agula to Dolo, a distance of 15 miles to the southward, is over three ranges of limestone hills, from 500 to 800 feet high, with intervening valleys. From the last ascent there is a magnificent view down the wide gorge to the westward, with a series of distinctly-marked terrace-lines round the hills. At the summit I obtained a bearing of the Aloquor Peak, towering above the southern front of the Harat Range in the blue northern distance. This peak is immediately above Adigerat. At the same time I got another bearing of Amba Aradom, a hill just over Antâlo, to the south. The Dolo ravine, running from east to west, opens upon the plain of Gembela, which appeared to be covered with green crops, rich pasture, and villages:—

At Dolo Camp (8 A.M.):—

Boiling point	199·6°
Aneroid	23 inches.
Temperature	59°
Height above sea	7585 feet.

From Dolo there is a good road over a grassy plain for 9 miles, to a place called Haik-hallat, which is separated from the vast plain to the south of Antâlo by a chain of hills, of which Amba Aradom, the hill immediately above Antâlo, forms the nucleus. The drainage of the Haik-hallat Plain flows down the valley to the westward, and irrigates the fields and gardens of Chelicut. This town is far and away the most pleasant and picturesque that we have yet seen in Abyssinia. It is in a valley on the northern side of the Amba Aradom Mountains. The valley is abundantly watered, and numerous channels are led away to irrigate the fields. Chelicut was founded by Râs Walda Selassyè, the friend of the Englishmen Salt and Pierce. Its church, dedicated to the Trinity, is surrounded by superb juniper trees of great height; two glorious *dahros*, where the elders of the town arbitrate, spread a wide shade over a strip of soft turf, bordered by a running stream, and all the houses are surrounded by gardens of Chile pepper and groves of trees. There are several plantain-trees in the town, and one peach-tree.

Chelicut is a few miles north-east of Antâlo, on the opposite side of the hills:—

Chelicut (11·30 A.M.):—

Boiling point	200·2°
Aneroid	23·26 inches.
Thermometer	69°
Height above sea	7275 feet.

Antâlo is the ruins of a large town on a high plateau, just under the southern face of the rocky peak, called Amba Aradom.*

* I found the height of Amba Aradom to be 10,240 feet.

The circular huts of stone and mud are mostly unroofed and deserted, and the great palace of Ras Walda Selassyè is an utter ruin; but there are still eight churches round the place, with their pleasant groves of trees:—

Antâlo* (1 P.M.):—

Boiling point	198·2°
Aneroid	22·30 inches.
Thermometer	76°
Height above sea	8432 feet.

From the foot of these heights, on which Antâlo is built, an enormous undulating plain stretches away to the southward, covered with long grass and large stones. It is bounded on the south by a plateau, beyond which there is the fine range of the Wadjerât Mountains, and in that direction is the road onwards to Lake Ashangi. A river, called the Buya, with its tributary streams, waters this dreary plain; and the camp† has been formed on a stony knoll, about 200 yards from the stream and 8 miles from the town of Antâlo:—

At Buya Camp (5 P.M.):—

Boiling point	200·2
Aneroid	23·20 inches.
Temperature	74°
Height above sea	7261 feet.
Nearly on a level with Chelicut.	
Variation, &c., (by Azimuth)	9° 8′ W.
Latitude (mer. alt. ⊙)	13° 14′ 2″ N.

The climate of the region between Senafé and Antâlo is, at this season of the year, the most delightful in the world. The heat of the sun, which is never oppressive, is tempered by light clouds and fresh breezes, and the nights are deliciously cool. On the plain south of Antâlo there is generally a strong wind from the eastward, commencing about noon and dying away at sunset. Meanwhile heavy clouds, with thunder and lightning, gather about the mountains, where it often rains, and twice we have had heavy night-showers over the camp.

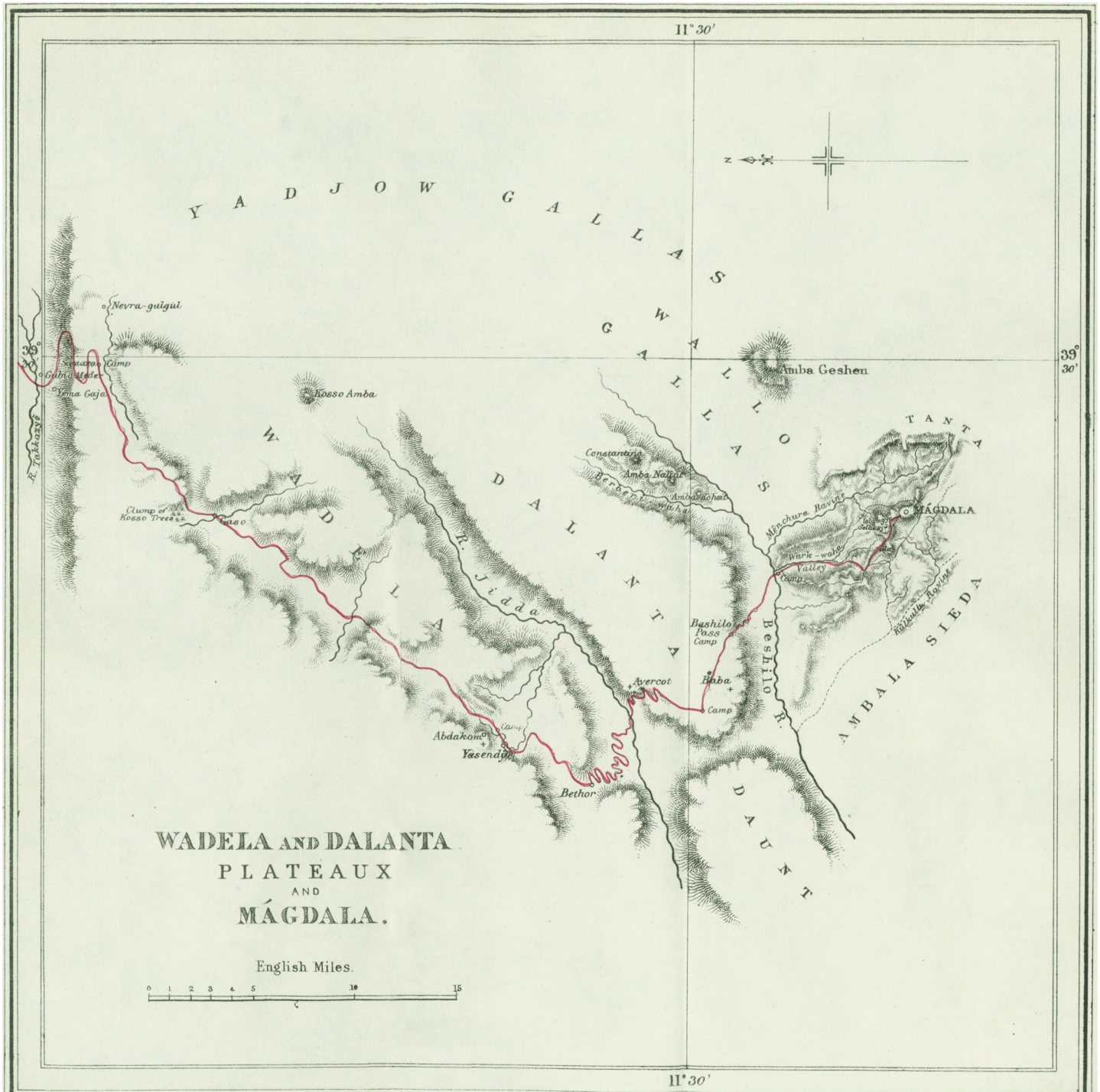
In conclusion, it will be well to make a few observations respecting the resources of the country on the line of march. Of butcher's meat and ghee there is an ample supply everywhere. The supplies of grain vary in amount at the different points on the march; but the commissariat officers have never failed to obtain large quantities at every market where time has been

* Taken in Ras Walda Selassyè's *adrash*, or reception hall.

† Called Buya Camp. The river flows away to the westward in the direction of the Salowa Province, and eventually to the Takkazyè. All this part of the War-Office map is very incorrect. Very few of the names on it are recognizable by the natives.

given to allow the people in the neighbourhood to become aware of our wants, and of the prices paid. Salt is, of course, to be obtained in any quantity from Atsbi, and throughout the country grass is abundant. These are the only absolute necessaries for a march on Mágdala, and of these the grain alone is insufficient in quantity for a force of 2000 men. All the people between Senafé and Antâlo came forward eagerly to carry bags of flour and grain for the English. From Senafé they agreed to carry bags (weighing 60 lbs.) on their bullocks, to be paid one and a half dollar for each, on delivery at Adigerat. At the latter place they entered still more readily into the agreement, brought all available means of transport to bear—bullocks, donkeys, wives and daughters—and in two days delivered upwards of 63,000 lbs. at Agula. The Muhammedans of Agula were equally ready with their camels and donkeys, and similar arrangements will be made onwards from Antâlo. Great numbers of strong little mules are to be purchased along the line of march. The road at this season, is excellent nearly the whole way, and the few places which presented any difficulty for laden baggage animals and the mules carrying the Armstrong battery were made practicable in a couple of days by a small pioneer force one march ahead.

The region which I have thus briefly endeavoured to describe is one which contains many of the sources of the Atbara, the chief fertilising tributary of the Nile, as well as those of the Mareb, and its most marked features are the great mountain-knot of Harat, parting the drainage of the Nile and Mareb, and the sudden depression at Dongolo, which separates it into two distinct divisions as regards climate and vegetation. It is also interesting as containing all the sources of the Ragolay system of rivers on the Red Sea side of the Abyssinian Alps. In my first paper I gave some account of Colonel Merewether's expedition from Mulkutto, the results of which were the exploration of the Ragolay Valley on the coast, until the river was lost in a depression far below the sea level, and the collection of valuable information respecting its affluents. I now beg to draw attention to the labours of M. Munzinger (our Consular Agent at Massowa, at present accompanying this force,) in the same direction. Last autumn he landed at Hanfila, crossed the great salt plain to Ala, within a short distance of Atsbi (Atebidera), then marched northwards, discovered the River Ragolay, and went on by land to Zulla. The difficulties and hardships he encountered in these fearful marches would have daunted most men, whilst his Report adds much to our knowledge of this previously unknown but most remarkable region. M. Munzinger has also collected and made available a large quantity of data for cor-



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rectly mapping Bogos, Sarawe, and indeed all the northern frontier lands of Abyssinia. His invaluable services to this expedition will doubtless be rewarded by the Government; but as a contributor to geographical knowledge, and as an explorer, I venture to submit that M. Munzinger fully deserves the honour of election as an Honorary Corresponding Member of the Royal Geographical Society.

VIII.—The Region between Antâlo and the Beshilo, and the Topography of Mágdala.

May, 1868.

The country between Antâlo and Mágdala is a mountainous region entirely composed of volcanic rocks, but it is divided into two very distinct parts by the river Takkazyè. That to the north is an elevated ridge, crossed by several lofty ranges of mountains. That to the south is a plateau of still greater height cut by ravines of enormous depth. The former contains the sources of the Tellare, a chief affluent of the Takkazyè, and those of the Takkazyè itself. The latter is drained by the principal affluents of the Blue Nile. The volcanic region commences beyond the valley of Musgi, immediately to the southward of the plain of Antâlo. From Senafé to Antâlo the rocks are almost all aqueous or metamorphic, with a few trachytic and basaltic boulders on the surface; to the southward of Antâlo there is a complete change, and this change is not confined to the geological features of the country. The scenery becomes grander, the vegetation more varied and more abundant, and the supply of water more plentiful.

The magnetic courses and distances (chained) of the stations between Antâlo and Mágdala are given in the Table overleaf.

The plain of Antâlo is bounded on the south by the deep valley of the Musgi, beyond which is the mountain range of Wadjerât, towering up into peaks, such as Alaji, which attain a height of 10,000 feet above the sea. The peculiar feature of the whole region, which I shall endeavour to describe, is that, while the backbone of the mountain system runs north and south, with drainage to the east and west, it is crossed by ranges of great elevation running across it in the direction of the drainage and dividing it into sections. Thus the Wadjerât mountains rise up as a great southern barrier separating the dreary plains round Antâlo from the rich valleys of the volcanic formation.

On the other side of the Wadjerât mountains is the valley of Atala. There are two ravines running up through the northern faces of this transverse range, and leading south to Atala. One well to the south-east is called Gurub-dekdek, and the road up

MAGNETIC COURSES AND DISTANCES OF STATIONS BETWEEN ANTÂLO AND MÁGDALA.

	Course (Magnetic.)	Distance (Chained.)		
Buya Camp (Antâlo) to—	°	Miles.	Fur.	Yards.
1. Musgi	S. 5½ E.	7	3	110
2. Amba Alaji	S. 11 E.	12	2	42
3. Atala	S. 13½ W.	3	2	132
4. Ayba	S. 10½ W.	2	5	0
5. Amba Ferrah	S. 13½ W.	2	6	80
6. Belâgo	S. 4 W.	2	2	0
7. Makhan	S. 1½ E.	5	1	50
8. Haya	S. 5½ E.	4	3	0
9. Top of Ashangi Pass	S. 25½ W.	2	2	50
10. Ayni Mai	S. 52 W.	2	7	80
11. Border of Ashangi Lake	S. 26 W.	4	1	90
12. Mes-agita	S. 2½ E.	2	7	60
13. Womberat Plateau	S. 21 W.	3	4	50
14. Lât	S. 60 W.	3	4	88
15. Dafat Pass	S. 56½ W.	3	3	132
16. Asan-galla	S. 11 W.	4	4	40
17. Ayo	S. 23½ W.	6	0	0
18. Dildi and Mezgar Amba	S. 22½ W.	5	7	0
19. Camp on the Tellarè	S.	1	0	0
20. Wondaj Pass	S. 17 W.	5	7	80
21. Takkazyè	S. 23 W.	10	1	154
22. Gubia-meder	S. 19 E.	0	6	132
23. Top of Santara Pass	S. 20½ E.	2	0	100
24. Santara	S.	1	1	170
25. Gaso	S. 64 W.	9	1	180
26. Abdakom	S. 59 W.	15	4	0
27. Yasendyè	S. 34 W.	2	3	132
28. Bêt-hor	S. 68½ W.	5	5	150
29. Bed of Jitta River	S. 46½ W.	4	1	150
30. Tekrena Water (on Dalanta)	S. 1 E.	3	4	130
31. Head of Beshilo Pass	S. 58 E.	3	5	170
32. Mágdala	S. 25¾ E.	12	4	0
		147	3	202

it leads by a place called Mesno to Atala. The other runs straight or nearly due south, and was the one selected for the march of the English troops. It is called Bêt Mayra, and forms a very beautiful gorge. A noisy stream flows down the gorge to join the Musgi, and irrigates a succession of barley crops grown on carefully-levelled terraces, which rise one above the other up the ravine. Above them the gorge is full of fine trees —tall acacias, myrsine, figs of various species, and a very pretty *crotalaria*. The road often crosses the stream, and at some points passes along a ridge above it, with the tops of the trees rising from the bottom just to a level with the traveller's eye. At one place the mountain sides recede, there is a stretch of

velvety turf, and the brook is overshadowed by wide-spreading willow-trees. This is the halting-place of Meshek; and here the steep ascent to the saddle of Alaji commences, with the lofty peak called Amba Alaji on the right and the cone-shaped mountain top of Yumasa on the left. The sides of the mountain are well clothed with juniper and rose-trees, and there is a gigantic thistle 12 to 14 feet high. We found the saddle, by a comparison of aneroid and barometer observations, to be 9700 feet above the sea. The Amba rises up on the right some 800 feet higher, ending in a steep grassy peak, with scarped precipices just below. Here, on a rocky shelf, there are five or six houses with thatched roofs, almost overhanging the pass, the impregnable abode of the chief of Wadjerât. The descent into the Atala valley is not so long, and there are terraces at intervals, but the crest of the pass is 2800 feet above the camping-ground at Atala.

The Atala valley is narrow, running south-east to north-west, with a plentiful stream flowing through it, in the direction of the low land of Bora to the westward, to join the Takkazyè. The range to the south derives its name from a high peak called Bota, and separates the valley of Atala from that of Ayba. Beyond the Ayba valley there is another transverse range—that of Ferrah, also named after a mountain mass rising up on the right of the road. This Amba-Ferrah is a succession of grand precipices—a glorious mass of rock, not terminating in a peak like Alaji, but in angular walls of rock, with bright green steeps and ledges intersecting them. It rises up immediately on the right of the pass, which winds up the shelving hills down which a bright stream flows into the Ayba valley. The hills are covered with juniper bushes, and the hollows are golden with a pretty St.-John's-wort, which here first makes its appearance. On this pass, too, the *kosoo* tree was first seen. Large boulders covered with moss are scattered over the grass, and here and there thickets of wild roses scent the air, growing with a bright purple indigo and a *crotalaria.* The gigantic thistle rises above all, and on the higher slopes there is a heath with a white flower. A long descent, broken by two broad terraces, leads down from the saddle of Ferrah into the valley of Dobâ. The first terrace is called Belâgo, and is covered with irrigated barley crops; the drainage being westward to the Bora low land. The height of the Ferrah pass above the Dobâ valley is upwards of 2000 feet.

From the Ferrah-Amba there is a range of mountains running north and south, and forming a distinctly-marked watershed, as far as Ashangi; the Dobâ and Makhan valleys, through which the road passes, being on their eastern sides, and the drainage

of these valleys being to the east. There are five conspicuous peaks on this longitudinal range, commencing from Ferrah, namely, the Ferrah-Amba itself, Afaji, Tsahefti, Bokero, and Sarenga. There are deep cracks round the base of Afaji, which are said to have been caused by the earthquakes in 1864, and the natives assert that these earthquakes also caused great changes in the water system of the Dobâ valley, some springs drying up and others appearing. The mountain sides which slope down from Belâgo to Dobâ are covered with trees and flowering bushes, and the scenery becomes very beautiful. The valley is covered with coppices and open grass-fields, and near its centre a conical hill rises up, crowned by the fenced village of Ajiera. Along the foot of the western mountains the ground is cut deep by well-wooded ravines. The ridges and hollows are covered with juniper-trees, above which rise, here and there, the tall stems and spreading branches of the umbrella-shaped acacia. A low saddle leads from the Dobâ into the equally well-wooded vale of Makhan. Here clumps of tall junipers are scattered over the grassy glades and knolls, and in the bottoms, near the brook which flows off to the eastward, there are thickets of *khadoo*, fig, brambles, wild roses, jasmine, and clematis. The round hills, dividing the two valleys to the east, are crowned with villages of circular huts, fenced round with thick hedges of kol-quall.

The lower country to the eastward of this alpine region, from Antâlo to the Takkazyè, is occupied by lawless tribes of Mohammedan Azebo Gallas. From the summits of all the passes, looking to the eastward, we could see the same broad valley, apparently extending north and south, for upwards of 200 miles, and receiving all the eastern drainage from the Abyssinian alps. Beyond it, in the far eastern distance, were ranges of mountains rising one above the other; and the valley itself appeared to be covered with jungle, and to have a river running through it. In this country, still entirely unknown to Europeans, dwell those incorrigible robbers and murderers, the Azebo Gallas, who profess Mohammedanism, and make incessant raids on the Christian inhabitants of the highlands. Hence the thick kol-quall fences round all the villages, which are usually perched on isolated hills.

The mountainous country between Makhan and the basin of Lake Ashangi, about 14 miles across, is well wooded, the hill-sides being covered with junipers as tall as Scotch firs, flowering St.-John's-wort growing as trees, and a heath with a white flower, in the form of a bush, sometimes 30 to 40 feet high. The drainage is still to the eastward, and lofty peaks shut out the view to the west. The view from the southern edge of this

highland is magnificent. Far below lies the bright blue lake of Ashangi, bordered by a richly cultivated plain, and surrounded by mountains on every side. To the westward this mountain barrier is very high, but to the east the hills are comparatively low, and appear to slope away rapidly, on their eastern sides, to the valley of the Gallas, which is at a much lower elevation. Thus the landscape presents the curious effect of an Alpine lake surrounded by mountains and without an outlet, lying on the edge of a vast extent of country at a much lower elevation.

The basin of Lake Ashangi is a flat plain with the sheet of water occupying its southern half. On the north side there is rich pasture for cattle, and much wheat and barley cultivation; the fields being artificially levelled in terraces, and extending in steps far up the skirts of the hills. The villages are perched up on the tops of conical hills or high on the sides of the western mountains, and at sunset the cattle and labourers may be seen winding their way up the steep paths in all directions. Round the north end of the lake there are deep fissures full of soft mud and quicksands, which are excessively dangerous. These fissures are said by the people to have been formed by the earthquake of 1854.

The lake of Ashangi is 4 miles long by about 3 broad, and about 8000 feet above the level of the sea. I found the latitude by meridian altitude of **Dubhe* to be 12° 36′ 40″ N. It furnishes one of the very rare examples of a freshwater lake without any apparent outlet, the water probably escaping at some point on the eastern side by percolation. The surrounding mountains are all volcanic.

On the western side there is only a strip of land about 200 yards wide between the mountains and the shores of the lake, and at one point a promontory descends abruptly into the water, with a broad sheet of waving corn extending along its northern base. Myriads of geese, ducks, cootes, and curlew frequent the lake or wade amongst the reeds in the treacherous mud on its shores. At the south end there is a break in the mountains, and a gradual ascent leads to the plain of Wofela. To the south the mountains forming the high table-land of Womberat rise abruptly from the Wofela plain, and the jagged volcanic peaks to the westward are a continuation of the range which bounds the Ashangi basin. At the south-west angle of the plain, where this range approaches the Womberat mountains, there is a gap, or rather low saddle, clothed with tall juniper trees, forming a shady grove; on the other side of which a long valley runs westward, having mountains on either side, deeply scored with torrent-beds. A lofty mountain peak rises

over the valley some miles down, and I got a view of a very rugged country far to the westward, at a lower elevation, probably part of the Wag province.

The road leads up a wild gorge to the Womberat plateau, and then by a long descent to the Valley of Lât. This highland sends its drainage to the Galla country, passing round to the eastern side of Lât; so that from Lât onwards to the Takkazyè, all the streams again become fountains of the Nile. From Womberat there are distant views of the Galla country to the eastward, while far away to the S.S.E. is the mysterious plain of Zobul, concerning which there are many traditions. It is said that, in ages long gone by, there was a Christian kingdom in Zobul, that old churches are still standing there, that the bells are heard ringing from afar, but that no man dares to approach them, because spirits guard those holy places.

Lât is a narrow valley, fertile and well watered, whose river pours over a precipice and joins a tributary of the Tellarè flowing away to swell the Takkazyè. South of the Lât Valley the Dafat mountain range crosses the line of the watershed, and about 16 miles further south (as the crow flies) is the still loftier parallel range of Abuya-meder, which forms the northern boundary of the valley of the Takkazyè. The intervening country, being a portion of the Lasta Province, is very mountainous, and contains the sources of the River Tellarè, one of the principal affluents of the Takkazyè.

The Dafat mountains are covered with compositæ, labiate shrubs, white heather, roses, jassmine, clematis, juniper, and St.-John's-wort. The St.-John's-wort (*hypericum*) grows as a large tree, the trunk of one of them being 18 inches in diameter, and they are one mass of bright orange flowers. The Dafat Pass was 9820 feet above the sea.

This part of the Lasta district is broken up into a succession of mountain spurs and deep ravines; but it is well watered and fertile, and there are no scarped cliffs or perpendicular gorges, so that the difficulties of the road are insignificant. The scenery is very fine, and there is much cultivation in terraces up the mountain sides. At the foot of the long ascent of the Abuya-meder mountains, by the Wondaj Pass, flows the River Tellarè through a rocky gorge, and the clear water dashes noisily over huge boulders. Here the camp of Dildi was formed, on the north side of the river, with the peak of Gubarji towering over the nearer mountains to the south-east, and the lofty slopes of Abuya-meder brilliantly green with barley crops to the south-west. The country is well wooded, and a rippling stream flows down every valley. The Tellarè, at this point, which is within 4 or 5 miles of its source, is never more than

10 feet across at this season, but it is evidently a mighty torrent in the rains. The whole bed, covered with large water-worn boulders, averages a width of 20 yards, and in places the rushing water washes a wall of alluvial soil, with large round stones embedded in it, which is from 4 to 6 feet thick.

The ascent up the Abuya-meder mountains, from Dildi on the banks of the Tellarè, to the summit of the Wandaj Pass, is 7 miles long; Dildi being 7400 and Wandaj 10,500 feet above the level of the sea. Thus Wandaj is the highest point on the road between Senafé and Mágdala. The sides of the Abuya-meder mountains, though very steep, are cultivated, and many villages are within sight from the road. Small rills and brooks irrigate the land, flowing over banks of soft turf and white clover, or dropping down cliffs of black rock shaded by juniper, with masses of orange aloe flowers raising their long spikes above the bushes below. From the summit of the pass there is a glorious view of the Dafat range to the north, with a sea of mountain peaks intervening; of the great Azebo Galla Valley to the east, and of the Takkazyè Valley—with the straight line of the Wadela plateau—to the south.

The Abuya-meder Mountains separate the valleys of the Tellarè and Takkazyè, the source of the former river being on their northern, and that of the latter on their southern face. The streams flowing down the deep ravines to the south unite and form the Takkazyè. The most distant source is some 10 miles away due east in Angot; but the 'Ayn Takkazyè, the fountain of tradition, is close at hand, at the foot of a peak called 'Ayn Kirkum, and this stream has the honour of being considered the source of the great fertilising tributary of the Nile, because Menilek, son of the Queen of Sheba, is said to have struck a rock there, and caused the water to well forth. Old Tellez correctly describes the 'Ayn Takkazyè ravine as a place where three several springs gush out violently within a stone's throw of one another. They are shaded by a grove of kosso and juniper trees, surrounding a Christian church. The next ravine, on the southern slope of the Abuya-meder range to the westward, is called Marora; and then comes that which runs south from the Wandaj Pass, known as the Briganut-wanz.* Still going westward, and divided by a mountain spur from the former, is the Sohona-wuns, commencing at the foot of a lofty peak called Zugagisi. The Rigach-wanz joins the Sohona, and still further west is the Mal-wanz, passing between Lalibela, the capital of Lasta, and Sagubnaf, where the camp of Gobazye was long pitched. The streams flowing down these ravines

* Wanz is Amharic for a ravine.

unite to form the River Takkazyè, which flows from east to west in a deep valley. All the ravines are bright green with irrigated wheat and barley crops, while here and there a village is perched upon the overhanging hills, with a clump of trees concealing a church close by.

South of the Takkazyè the nature of the country entirely changes. Hitherto we had passed over a broken mountainous region, where lofty ridges alternated with deep ravines. But from the Wandaj Pass, looking across the Takkazyè Valley, we got the first view of the Wadela plateau, a mighty wall, 2600 feet high, rising abruptly from the valley, and ending in a level summit at an elevation nearly equal to that of the Wondaj Pass itself.

I found the bed of the Takkazyè to be about 8000, and the summit of the pass up to the Wadela plateau 10,400 feet above the sea, by observations of the boiling point and aneroid. At this season it is but a small stream, easily crossed dry-shod, by jumping from stone to stone; but the extent of the river-bed showed what it was during the rainy season, even at this short distance from its source.

The plateau of Wadela is bounded on the north by the valley of the Takkazyè, on the south-east by the Jitta, and on the north-west by the Tchetchéo, the two latter rivers falling into the Beshilo; and its average level is some 2000 feet above them. The north-eastern half is composed of trachyte, with beds of black tourmaline and amygdaloidal trap, and consists of a succession of rolling hills and valleys, with occasional ridges of scarped rock; streams flowing to the Jitta, and swampy pools in the low ground. With the exception of clumps of kosso and other trees round the churches, Wadela is without either trees or shrubs, the hills being covered with grass and small wild herbs, the most common of which is a bright yellow composita. The scenery is wild and desolate, not unlike that of the interior of the Orkney Islands. The south-western half of Wadela is composed of columnar basalt, and is more level and fertile. Extensive tracts are under wheat and barley cultivation, and there are large flocks of sheep and goats and herds of cattle, besides horses and asses. The people weave woollen and cotton cloths, the wool being raised on the plateau, and the cotton imported from the Yadjow Galla country to the eastward.

The north-eastern part of Wadela is about 10,400 feet above the sea, but towards the Jitta ravine it is not more than 9100. The English troops, after crossing the Takkazyè and reaching the plateau of Wadela, instead of marching direct on Mágdala by Kosso Amba, turned off in a south-west direction in order to reach the great road made by King Theodore across the Jitta

ravine, from the Wadela to the Talanta plateau. A large part of the length of Wadela was thus traversed, from Santara, near the point where the Takkazyè was crossed, to Bêt-hor at the edge of the descent to the Jitta, a distance of 34 miles. The first stage, from Santara to Gaso, is 9 miles, and at Gaso the trachyte formation ends, and the basalt commences. From Gaso to Abdakom, the next stage, is a distance of 15 miles over a well watered grassy country, with much corn cultivation and many villages. From Abdakom to Yasendyè* is 2½ miles, and from Yasendyè to Bêt-hor 5½ miles.

The Jitta River separates the Wadela plateau from that of Dalanta. The height of these table-lands above the level of the sea, along the line where the Jitta divides them, is the same—about 9200 feet—and it is evident that they were once a single mass of columnar basalt. But, in the course of ages, the Jitta has cut its way down for a depth of 3500 feet, carrying millions and millions of tons of earth and rock away, to fertilise the delta of the Nile, and forming a ravine of extraordinary size, which, had it not been for King Theodore's marvellous road, would have been the most formidable obstacle on the line of march from the coast to Mágdala. I found the height of the plateaux to be 9200 feet, and the bed of the Jitta 5720 feet above the sea, so that the depth of the ravine is 3480 feet. The northern side of the gorge has a scarped wall of basalt at its summit, with beds of white clay intruding, in patches, and numerous lumps of a prase opal. The sides of the ravine have a parched arid look, the only vegetation being kol-qualls and acacias. There are terraces of broken ground about half-way up, on either side, corresponding with each other as regards height above the river-bed, and showing, beyond doubt, that this deep gorge has been formed by the gradual action of water, over a long course of ages. The descent of 3480 feet, by Theodore's trace, is performed along a distance of 4 miles and 6 furlongs, the width of the river-bed is 200 yards, and the ascent to the Dalanta plateau is 3 miles and 2 furlongs in length. The bed of the river is covered with large water-worn stones, but, in the dry season, the water is only in pools communicating by percolation. Some fine *dahro* trees grow at the edge of the river-bed.

The Dalanta plateau is a mass of columnar basalt between the rivers Jitta and Beshilo, with its surface upwards of 9000 feet above the level of the sea. To the south-west it is bounded by a gorge or depression, which separates it from the Dâunt plateau, the latter extending to the point where the two rivers

* Yasendyè means literally "of the wheat"—the wheat district.

unite. The southern part of Dalanta is about 5 miles across, but it becomes broader to the north-east, the distance between the rivers increasing as their sources are approached. Talanta is a flat plain, quite treeless, except the clumps round a few churches, and with a rich black soil several feet thick, save where the streams have worn it away and laid bare the pentagon-shaped tops of the basalt columns. From most points of view the scarped sides of the Dâunt plateau and of the Jitta and Beshilo ravines are just visible at the edges of the plain. The flora, at this high elevation, is very English, consisting of dog-roses, nettle, yellow and purple compositæ, clover, and plantain. From the edge of the plateau, looking S. 30° E. over the Beshilo ravine, there is a view of the heights forming the Mágdala system, and of what at first sight appears to be a confused mass of brown, forbidding mountains, piled one over the other, from the banks of the Beshilo; but on a closer inspection it all becomes clear. The ravine of the Beshilo is even deeper than that of the Jitta, the bed of the river being only 5638 feet above the sea, and the river itself was up to the horses' girths, being far the largest volume of water that has been met with in any stream on the line of march. The length of the descent is 4 miles 4 furlongs, and the width of the river bed 113 yards. Near the top the sides are perpendicular, and at the base of the cliffs the huge boulders of columnar basalt which had broken off, were exactly like bundles of tree-stems. Beds of clay were here and there intruded in the basalt. The vegetation of the Beshilo gorge consists of kol-qualls, a celastrus, a myrtacea, and some fine umbrella-shaped acacias; but the dark-coloured rock and brown dried-up grass give a sombre effect to the scene, which is scarcely relieved by the scattered trees. Two miles to the east of the point where King Theodore's road begins to descend the Beshilo ravine, the uniformity of the basalt wall, which forms the side of Dalanta, is broken by a ravine containing a little stream called the Berberi-waha ("Pepper-water"), which falls into the Beshilo. The narrow ridge thus separated from the Dalanta plateau by the ravine of the Berberi-waha on one side, and by that of the Beshilo on the other, consists of three peaks, forming *ambas*, or natural fortresses, called Amba Koheit, Amba Nebiet, and Constantina: two held by the Christian chief of Dalanta, and one by the Mahommedan Wollo Gallas, whose territory lies to the eastward of the Beshilo. With this exception, the north-west side of the Beshilo ravine consists of a mighty basalt wall, 3500 feet high, broken by one or two irregular terraces. But on the south-east the original basaltic wall is now cut deeply by ravines and gorges, which leave isolated peaks and plateaux between them; and a detailed

description of this region will comprise an account of the topography of Mágdala and its vicinity.

The lofty plateaux of Tanta and Ambala-sieda, on the east side of the Beshilo, which correspond with that of Dalanta on the west side, recede for a distance of 9 miles in some places, the intervening country being broken up by ravines and gorges. Two of these ravines, of immense depth, are divided from each other at their heads by a series of ridges and terraces called Thaddat, Korakor, and Sangallat, which form a sort of irregular rocky isthmus, uniting the table-land of Tanta with Mágdala. The ravine to the east is called the Valley of Mênchura, and enters the Beshilo valley between scarped cliffs. That to the west is the Valley of Kûlkula, and is of much greater length, entering the Beshilo ravine at a very acute angle far to the westward. The Mágdala system, or knot of mountains, rises up between the Mênchura and Kûlkula ravines; the sides to the east and west being steep and precipitous, and nearly 3000 feet high. Mágdala itself is a mass of columnar basalt, with scarped perpendicular sides, and with a plateau on the top about 2 miles long by half a mile across. It is 9050 feet above the level of the sea, and thus a few feet lower than the Talanta plateau. At its south-east end there is a lower terrace, which is approached from Tanta by a pass, called the Kaffir-bir, where there was a fortified gate. At the northern end was the gate called the Koket-bir, whence a steep descent of nearly 500 feet leads down to the saddle of Islamgyè. The Mágdala system consists of the plateau of Mágdala itself, the peak of Selassyè, and the plateau of Fâla; the three heights being connected by saddles at lower elevations. Between Mágdala and Selassyè is the saddle of Islamgyè, 6 furlongs in length: a flat plain, on which the camp of King Teodoros was pitched, with perpendicular cliffs on either side, whence the mountain-sides slope rapidly down to the Mênchura and Kûlkula valleys. Selassyè is a mountain terminating in a sharp peak, or rather short ridge, 9200 feet above the sea. It is composed of trachyte of a light colour, and is named after a church dedicated to the Trinity (Selassyè), with a clump of tall trees round it on the outer slope. Selassyè and Fâla are connected by a saddle some hundred feet below the level of Islamgyè, which is approached from it by a rocky zigzag path; and Fâla, like Mágdala, is a flat-topped mass of basalt. But these three heights of Mágdala, Selassyè, and Fâla are not in a line; they form an angle of which Selassyè is the apex, and Mâgdala and Fâla the two legs. The leg from Selassyè, along Islamgyè, to the end of Mágdala, has the deep ravines of Mênchura and Kûlkula, one on either side; while that from Selassyè to Fâla faces the broken

country towards the Beshilo. Thus, in approaching from the Beshilo, Selassyè, Fâla (and the saddle connecting them), alone are visible; while Mágdala and the Islamgyè saddle are concealed by the higher ground of Selassyè and its encircling ridges. On the plateau of Mágdala itself there is no water; but there are several wells on Islamgyè, one in the rear of Fâla, and another, called Shamba-koch, in the Kûlkula ravine.

The portion of the Mágdala system which is visible from the Talanta plateau, and which faces to the north and west, is the mountain-side which is crowned by the Selassyè peak at one end, and the Fâla plateau at the other. At the foot of Fâla is the small plain of Arogyè, 1 mile and 3 furlongs across, with a gradual slope of 440 feet, and 1140 feet below the Fâla plateau. There is a spring, furnishing a limited supply of water, on Arogyè, which is dotted with thickets of myrsine, crotolaria, kolqualls, and the large labiate bush called *tchendog*. A ravine, with the sides clothed with bushes, running down from the Fâla saddle, and uniting with another defile which bounds Arogyè to the north-west, forms the head of the Valley of Wark-waha ("Golden Water"). Other ravines, from east and west, converge upon it. The Wark-waha, at this season a waterless valley, runs down to the Beshilo, and joins that gorge between the Kûlkula and the Mênchura; the distance from the Beshilo river, up the Wark-waha, to the head of the defile opening on the Arogyè plain bein 4 miles and 3 furlongs. Beyond (north-west of) Arogyè, and across the defile, there is a steep ascent of 460 feet to the loftier height of Aficho, where the British camp was pitched at an elevation of 7900 feet above the level of the sea. Towards the Beshilo the Aficho heights sink into those of Gûmbaji, which descend abruptly to the Beshilo ravine and form its southern wall. Ravines run off from the Aficho and Gûmbaji highlands to the Kûlkula on one side, and the Wark-waha valley on the other. To the eastward, the high broken country between the Wark-waha and Mênchura valleys, and extending from the foot of Selassyè to the Beshilo, is called Neft.

I found the latitude of Aficho, by meridian altitude of the star *Dubhe*, to be 11° 22′ 7″ N.

It will be seen from this description that the Mágdala district, with reference to the Dalanta plateau, is not, properly speaking, a mountainous region, but that it is simply a portion of the great basaltic mass which has been cut up and furrowed by the action of water during many ages. Mágdala and Fâla are isolated bits of the original plateau, and are at nearly the same height above the sea as the table-lands of Tanta and Dalanta, of which they appear once to have formed a part. The lofty range

of mountains in the Worro-Haimanot country, visible far to the eastward, seem to account for the cutting up of the country between Tanta and the Beshilo; while the deep drains formed by the rivers to the east and west have protected the plateaux of Dalanta and Wadela from further denudation. The scenery of this wild country, where the forces of nature appear to have been at work gradually, but with such tremendous effect, is most striking. Looking from the heights of Mágdala, the lofty ridges and profound ravines would appear very grand in their apparently wild confusion, were it not that the view is always bounded by the straight basaltic wall of Dalanta, which rises above them all, and has the effect of dwarfing everything below it. The drainage of Mágdala and Tanta, and of the Wadela, Talanta, and Dâunt plateaux, unite to form the Beshilo, which is one of the principal affluents of the Blue Nile.

The climate of the region between Antâlo and Mágdala was, during the time that I was in it—from March 12th to April 28th—healthy and agreeable: the hot sun being tempered by cool winds during the day, and the nights being cold. From March 12th to 24th there was not a drop of rain; but in the evening of the latter day a heavy thunder-storm broke over the camp at Dildi, with rain lasting from 6 to 9 P.M. On the 25th there was a shower in the evening; and on the 26th, towards evening and during part of the night, there were storms of hail and rain, with thunder, on the Wandaj pass. The Wadela plateau was excessively cold, with ice forming in the night, and the grass being covered with hoar-frost in the mornings. The minimum registered was 17° Fahr. The difference in temperature between the Wadela and Dalanta plateaux was very observable, the latter being much warmer. This may probably be accounted for by the deep warm ravines of the Jitta and Beshilo, which flank Dalanta on either side, while the Wadela plateau only has the Jitta ravine on one side, while it is much nearer to the cold rain-belt of the Abuya-meder mountains. From the 3rd to the 15th of April there were thunderstorms every day, with heavy rain, generally but not always commencing at about four in the afternoon, and lasting until two or three hours after sunset. On the 6th, a fearful storm of hail, thunder, and lightning burst over the Dalanta plateau, with hailstones of enormous size. After the 15th these rains ceased, and there was fine weather for nearly a month, although occasional local thunder-showers occurred further north, round Adigerat and Senafé. These rains never began until late in the afternoon, and, if the marches had been properly arranged, the troops need never have felt any inconvenience or discomfort from them. From the middle of March to the middle of April it rained on eighteen

days out of the thirty, the rain always coming with wind from the east; but this wet weather in the early spring has nothing to do with the true rainy season, which commences in the middle of June. While on the subject of meteorology, I must not forget to mention a curious phenomenon which occurred on the 13th of April, the day of the capture of Mágdala. Early in the forenoon a dark-brown circle appeared round the sun, like a blister, about 15° in radius; light clouds passed and repassed over it, but it did not disappear until the usual rain-storm came up from the eastward late in the afternoon. Walda Gâbir, the King's valet, informed me that Theodore saw it when he came out of his tent that morning, and that he remarked that it was an omen of bloodshed.

The region which I traversed, with the expeditionary field force, from the sea-coast to Mágdala—a distance of more than 300 miles—is one of considerable geographical interest; and the operations of the expedition have added much to our knowledge. On the coast the great system of eastern drainage comprised in the Ragolay and its tributaries has been discovered; and old Father Lobo's story of one of the pleasantest rivers in the world, with sweet herbs growing along its banks, flowing through a country which had always hitherto been believed to consist of a salt desert, has thus been explained. The remarkable passes from the coast to the highlands of Abyssinia have been thoroughly explored; the mountain chains forming the watershed of a vast region have been examined; and the numerous sources of the great fertilising tributaries of the Nile have been accurately surveyed. Besides the observations which I have taken, that most zealous and indefatigable of Quartermaster-Generals, Colonel Phayre, has completed a rough, but at the same time a most useful survey of the whole country that has been traversed. Dr. Cooke, in spite of severe illness, which would have disabled a less zealous inquirer, has done much valuable meteorological work; and the officers of the Indian Trigonometrical Survey have completed the mapping of the eastern portion of the Abyssinian highlands. The Trigonometrical Survey staff consists of Lieutenants Carter, Dummler, and Holdich, all of the Royal Engineers, with assistants, and provided with five chronometers, an 8-inch transit theodolite, and three 6½-inch theodolites. They have measured bases at Komayli, Senafé, Antâlo, and Ashangi; have made a survey extending for 15 miles on either side of the road, with more distant points intersected, as far as Ashangi; and Lieutenant Carter has carried on a route-survey as far as Mágdala with theodolite and plane table. They have taken vertical angles throughout for a section of the country; have made numerous astronomical

observations for latitude and longitude at each station; and from Antâlo to the coast the longitudes will be still more accurately fixed by means of the electric telegraph.

But, important as the geographical results of the Abyssinian expedition have been, *our* science is not the only one that will be enriched by it. Mr. Blandford, who, from his intimate knowledge of the analogous formations in the Deccan, was peculiarly well qualified for the work, has found the geology of this part of Abyssinia to be exceedingly interesting: so interesting, indeed, that he resolved to be amongst the last to quit Abyssinian soil. Mr. Blandford has also added to our knowledge of the zoology of the country, has made a large collection, and has ascertained the existence of four distinct zones into which the fauna is divided: one on the coast, the second in the Senafé pass, the third on the highlands, and a fourth on the lofty basaltic plateaux. Mr. Jesse, who was sent out by the Zoological Society, and several officers, have also made large collections of skins, both of birds and mammals. The botany, though very interesting, had already been thoroughly worked up by M. Schimper, the Nestor of King Theodore's captives. The country on the line of march also presents many points of antiquarian interest. The ruins of the Greek emporium at Adulis, on the coast, and of Koheito, at the head of the Degonta pass, offer a field of research of no common interest to the archæologist, as throwing light on the ancient intercourse between the Axumite kingdom and the Egypt of the Ptolemies. The cave church at Dongolo, the curious ruin at Agula, and the famous caverns of Lalibela, illustrate the later period, when one of the most ancient Christian churches was established in Abyssinia. Nor can it be said that nothing of antiquarian value was to be obtained worth taking away, when several thousand manuscript parchment folios were found in the library of King Theodore, and a golden chalice belonging to Seltan Segged, a king who flourished in the sixteenth century, was amongst the plunder of Mágdala.

The main objects of the Abyssinian expedition have been gained, and this is not the place either to discuss their importance, or the question whether other more lasting results might or ought to have been secured by its means. The men of science who accompanied the expedition have not returned empty-handed, and there are few regions on the globe where so much could be found to repay inquiry.